EPA/AMD/R04-98/087
1998

EPA Superfund
Record of Decision Amendment:

GEIGER (C & M OIL)
EPA ID: SCD980711279
OU 01
RANTOULES, SC
09/09/1998

EPA 541-R98-087

<IMG SRC 980870>

Amendment to the

Record of Decision

Summary of Remedial Alternative Selection

Geiger (C & M Oil) Site

Rantowles, South Carolina

Prepared by:
U.S. Environmental Protection Agency
Region IV
Atlanta, Georgia

DECLARATION FOR THE AMENDMENT TO THE RECORD OF DECISION

SITE NAME AND LOCATION

Geiger (C & M Oil) Site
Rantowles, South Carolina

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Geiger (C & M Oil) Site, in Rantowles, South Carolina, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this Site.

The State of South Carolina concurs on the selected remedy.

ASSESSMENT OF THE SITE

Since residually contaminated groundwater remains at the site, the site groundwater needs to be monitored until RGs are achieved.

DESCRIPTION OF THE REMEDY

This decision addresses the residual threat remaining at the

Site by monitoring the residually contaminated groundwater to ensure the protection of human health and the environment.

The major components of the selected remedy include:

Monitored Natural Attenuation of residually contaminated groundwater, including sampling selected monitoring wells at the site.

DECLARATION

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective.

Because this remedy leaves contaminated groundwater, a review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

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Amendment to the Record of Decision

Summary of Remedial Alternative Selection
Geiger (C & M Oil) NPL Site
Rantowles, South Carolina

1.0 INTRODUCTION

This Amendment to the Record of Decision and an earlier ROD Amendment (1987 ROD and 1993 ROD Amendment), provides a current status of activities that have been completed since the ROD was signed for the Geiger (C & M Oil) Site on June 1, 1987, and the ROD Amendment signed on July 13, 1993, documents the Agehcy's decision to use Monitored Natural Attenuation to address residual groundwater contamination, and incorporates the ROD and ROD Amendment by reference (Appendices A and B). All other provisions of the 1987 ROD and 1993 ROD Amendment issued by EPA not inconsistent with this ROD Amendment included herein remain in full force and effect.

1.1 Site Location and Description

The Geiger Site (the Site) s located along Highway 162 in Rantowles, Charleston County, South Carolina, approximately ten (10) miles west of the City of Charleston (Figure 1). The Site is in a sparsely populated rural area. Approximately ten (10) residences are located near the Site to the east and northeast.

The population in the immediate Site area is estimated at forty (40) people. Several small businesses are located within a half (0.5) mile of the Site along Highway 162. The property covers a five (5) acre area of very little topographic relief, however, the Site area is approximately one and one-half (1.5) acres in size. This affected area is triangular in shape and is bounded on two sides by ponds, and on the third side by a small rise, approximately five (5) feet higher than the Site area. Elevations on the Site range from approximately fifteen (15) to thirty (30) feet above mean sea level.

1.2 Site History

On June 1, 1987, EPA selected a remedial alternative for the Geiger (C & M Oil) Site cleanup which included:

- recovery of contaminated ground-water with on-site treatment and discharge to an off-site stream;

- on-site thermal treatment of excavated soils to remove organic contaminants;

- Solidification/Stabilization (S/S) of thermally-treated soil to reduce mobility of metals;

- During Remedial Design S/S would be reviewed to determine if S/S alone would achieve the remedial action goals; and

- During Remedial Design, soil cleanup goals would be refined.

A Potentially Responsible Party search conducted prior to the commencement of the Remedial Investigation/Feasibility Study (RI/FS) determined that there were no viable Potentially Responsible Parties. EPA, therefore, conducted the RI/FS and, since the signing of the ROD on June 1, 1987, EPA has conducted additional field investigations in order to better characterize and define the extent of the groundwater contamination. The results of the analysis of the additional groundwater samples showed only lead consistently above drinking water standards. Based on the results of the additional groundwater samples and because the revised remedy fundamentally changes the original remedy, the Agency has decided to amend the 1987 ROD pursuant to the National Contingency Plan (NCP), 40 C.F.R. § 300.435(c)(2)(ii).

1.3 Explanation of Fundamental Remedy Change

The 1987 ROD and 1993 ROD Amendment specified recovery of contaminated groundwater with on-site treatment and discharge to an on-site or off-site stream.

New information has been developed since the issuance of the 1987 ROD and 1993 ROD Amendment. First, the contaminated soils have been treated to prevent further leaching of contaminants to groundwater above drinking water standards. In addition, the latest groundwater sample results have indicated that there is no longer organic COCs in any monitoring wells, and lead has been the only inorganic COC conS/Stently detected above drinking water standards, and in only two out of approximately 27 monitoring

wells. Also, the level of lead has been decreasing in one of the two contaminated wells, and is near drinking water standards. The other monitoring well has had an increase in concentration, however temporary monitoring wells located between the site and this moLtoring well, did not show any detects of lead. In addition, this well is located in an undeveloped area. Thus, it does not appear that there is a definable "groundwater plume", but very localized contamination, and thus, the area of contamination is extensively smaller than originally thought. Because the soil has been treated-to prevent further leaching of contamination to the groundwater, and because additional sampling

conducted by EPA shows there is only one remaining COC, consistently detected above drinking water standards in only two very small localized areas, one of which is near drinking water standards, EPA believes that the most cost-effective means to address the residual groundwater contamination is monitored Natural Attenuation.

2.0 ENFORCEMENT ANALYSIS

A Potentially Responsible Party search was conducted in 1984 prior to the commencement of the RI/FS. It was determined that there were no viable Potentially Responsible Parties.

3.0 COMMUNITY RELATIONS

EPA prepared a Record of Decision (ROD) on June 1, 1987, taking into consideration the comments from the public. The most environmentally sound and cost-effective remedy was then selected as a part of the ROD phase of the Superfund process. EPA selected thermal treatment of the soils to remediate the organic contamination, S/S of the soils following thermal treatment to remediate the inorganic contamination, and recovery of contaminated ground-water with on-site treatment, and discharge to an off-site stream. EPA also stated that during the Remedial Design, S/S would be reviewed to determine if S/S alone would achieve the remedial action goals. A public meeting was held in January 1987 in which all the alternatives were presented. An information repository was established and is located at the Hollywood Town Hall in Hollywood, South Carolina, near Rantowles. There was another public comment period for the first ROD Amendment from May 25, 1993, until June 25, 1993. The Proposed Plan for this ROD Amendment was available for review and comment during the public comment period, June 30, 1998 to July 30, 1998, and is a part of the Administrative Record File, as required by CERCLA § 117, 42 U.S.C. § 9617, and the NCP, 40 C.F.R.§ 300.825(a)(2). No comments were received during the 1998 public comment period and no requests were received for an extension of the comment period or for a public meeting.

4.0 CURRENT SITE STATUS

4.1 Soil Contamination

The soil contamination at the Geiger Site has been addressed using Solidification/Stabilization which involved using cement in the reagent mixture. The area that was treated was triangular in shape, as described for the old lagoon area, and was treated to a

depth of approximately ten feet below land surface. The purpose

for treating the soils was to prevent further leaching of contaminants to groundwater above drinking water standards, thus protecting human health and the environment.

4.2 Hydrogeology

Groundwater Contaminants

The current areal and vertical extent of groundwater contamination were delineated from several sources of information. The original source of information was from the Remedial Investigation (RI). Since that time, additional monitoring wells were installed in 1988. There are currently twenty-seven (27) permanent monitoring wells on-site and off-site, located in clusters of two to three wells, which range in depth from approximately ten (10) to forty-five (45) feet below land surface. After the new monitoring wells were installed, these new wells and the wells installed during the RI were sampled. There also have been several additional sampling events since 1988; the last sampling event occurred in February 1997. During the 1997 sampling event, the permanent monitoring wells were sampled. In 1996 nine (9) temporary monitoring wells were installed between the site and the one monitoring well that has been increasing in lead concentration. Lead was not detected in any of these temporary monitoring wells. The permanent monitoring wells were also sampled at that time.

Sampling and analysis of the Monitoring wells from 1997 indicate the following:

Lead was detected above Maximum Contaminant Levels (MCLs) in wells MW-6s at 33 parts per billion (ppb) and MW-2s at 240 ppb. It was not detected in any of the other monitoring wells in the last two sampling events, either permanent or temporary.

No other contaminants of concern stated in the original 1987 ROD were detected during the last two sampling events (1996 and 1997) in samples collected from any of the permanent or temporary monitoring wells. Cadmium, however, has been detected below or just above its drinking water standard in MW-02s only, some of the time.

Based on the sampling data, groundwater contamination has been found primarily in the water-table wells located in the surficial aquifer. There does not appear to be a definable "contaminant plume", but two localized areas, one of which shows the contamination is near MCLs.

5.0 SUMMARY OF SITE RISKS

5.1 Public Health and Environmental Objectives

At the time the 1987 ROD was signed, there was no current public health threat to off-site residents and no significant risk to on-site workers under the reasonable case scenario via dermal

contact. Health risks associated with exposure by inhalation were considered negligible. Nearby wells, which were located upgradient, had not been affected by Site contaminants. There are no nearby private wells located downgradient. Under the future use scenario where the Site is developed and private wells are installed, it was determined that soil remediation would be necessary to prevent further leaching of contaminants into the groundwater as well as recovery of the contaminated groundwater in order to meet the remedial action objectives.

The waters of the surficial aquifer have been classified as Class GB groundwater by the State. Class GB aquifers are considered potential sources of drinking water and must be remediated to levels that do not adversely affect human health and the environment. Current sampling data indicates that one contaminant in the groundwater consistently exceeds drinking water standards (lead) . At the present time, all residents have access to municipal water.

6.0 ALTERNATIVES CONSIDERED FOR GROUNDWATER REMEDIATION IN JUNE 1987 ROD

The present and proposed groundwater alternative being considered for the Geiger Site are listed below in Table 2. For an in-depth analysis of the other groundwater alternatives originally considered, see pages 23 - 28 of the 1987 ROD.

6.1 Alternative Previously Selected For Groundwater

The selected remedy for groundwater, as specified in the 1987 ROD, was recovery of contaminated ground-water with on-site treatment and discharge to an off-site stream. The 1983 ROD Amendment allowed for the option of discharging to an on-site stream. The selection of this alternative is now being reevaluated because new information has been developed about the nature and extent of the contamination at the Site and changes in the relative costs of various remedies since the 1987 ROD and 1993 ROD Amendment.

6.2 Description of Alternative Currently Being Considered for Groundwater Remediation

Alternative A-1	Monitored Natural Attenuation
Alternative A-2	Recovery of contaminated ground water with on-site treatment and discharge to an on-site or off-site stream.

6.2.1 Alternative A-1 - Monitored Natural Attenuation

Alternative A-1 consists of monitored Natural Attenuation to address the localized groundwater contamination. The area of groundwater contamination has decreased significantly since the original ROD was signed in 1987. In one location the lead concentration has been decreasing, and is currently near MCLs. The other monitoring well has shown an increase in lead concentration, however, groundwater samples collected between

this well and the site, and behind the well also, have not shown any lead contamination. In addition, the soils have been treated to prevent further leaching of contaminants to groundwater.

For a detailed description of ARARs, see Sections 6.3(2) and 8.2 of this Amendment. The Monitored Natural Attenuation option is currently estimated at $34,000.

6.2.2 Alternative A-2 - Recovery of contaminated ground-water with on-site treatment and discharge to an on-site or off-site stream.

This alternative would consist of extracting contaminated groundwater, treatment in an on-site treatment plant, and discharge to an on-site or off-site stream.

At the time the 1987 ROD was signed, the estimated cost of the groundwater remedy selected in the ROD was approximately $2.5 million. The estimated time period for this alternative is greater than a year.

This alternative would treat the contaminants and reduce their migration. For an in-depth analysis of this alternative, including ARARs, see pages 23 - 28 of the 1987 ROD.

6.3 Comparative Analysis

This analysis will compare the alternatives, A-1 and A-2, for the nine evaluation criteria detailed in the National Contingency Plan (NCP) . For a more detailed analysis of the remedy selected in the 1987 ROD, see pages 23 - 28 of the 1987 ROD.

1. Overall protection of human health and the environment - Both of the alternatives would provide overall protection by reducing the residual threat by addressing the contaminated groundwater. Both alternatives would meet the remediation goals and be long-term protective of human health and the environment: A-1 by allowing Natural Attenuation process to address the contaminated groundwater, and A-2 by extracting and treating the contaminated groundwater.

2. Compliance with ARARs - Alternatives A-1 and A-2 would meet ARARs for groundwater. No waiver from ARARs would be necessary to implement either cleanup alternative.

For an in-depth analysis of the application of ARARs to the original remedy which would apply to the current preferred remedy see page 36 of the 1987 ROD. This would include the Safe Drinking Water Act.

3. Long-term effectiveness and performance - Both of the alternatives would provide a permanent remedy for the groundwater contamination. Therefore either alternative would meet this criterion and reduce the risk associated with groundwater contamination at this Site.

4. Reduction of toxicity, mobility, and volume - Alternative A-1 would not reduce the toxicity, mobility, or volume of the contamination through treatment, however, this alternative would

reduce the toxicity through a reduction in the contaminant concentration levels in the groundwater through natural attenuation processes. Alternative A-2 would reduce the mobility and volume of contamination through treatment.

5. Short-term effectiveness - Alternative A-1 would provide the greatest short-term effectiveness, since this option only consists of collecting groundwater samples. Alternative A-2, however, would not be as short-term effective because of construction activities of building the treatment plant and installing the extraction wells.

6. Implementability - Both alternatives are technically feasible. Since only groundwater sampling would occur for Alternative A-1, this alternative is the most easily implementable. Alternative A-2 is easily implementable and reliable since extraction and treatment of groundwater has been demonstrated at numerous sites.

7. Cost - Both of the alternatives are protective of human health and the environment. The costs associated with Alternative A-1 are significantly less than the costs associated with Alternative A-2 and for this reason, Alternative A-1 is the most cost effective remedy.

8. State Acceptance - The State of South Carolina concurs with the monitored natural attenuation alternative, A-1.

9. Community Acceptance - A public comment period was held from June 30, 1998 to July 30, 1998. No comments were received during this period nor was there a request for an extension to the comment period.

7.0 SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the detailed analysis of both alternatives, and public comments, EPA has determined that Alternative A-1 is the most appropriate remedy for the contaminated groundwater at the Geiger Site in Rantowles, South Carolina.

In addition, because most of the COCs stated in the original 1987 ROD have not been detected in the monitoring wells in the latest sampling events, EPA is revising the COCs for the groundwater to include only those contaminants detected above drinking water standards in the latest sampling events. The revised list of COCs will include the folldwing contaminants and their respective Remedial Goals (RGS) which are based on drinking water standards: Lead - 15 ug/kg and Cadmium - 5 ug/kg.

The groundwater will be sampled for all of the groundwater COCs, for the first five years. At that time, the parameters will be revised to include only those that were detected in the groundwater, above RGs, during the five year period. This is expected to be inorganics only. Sampling of the groundwater will occur twice a year for the first two years, and then annually for 3 years after this. At that time a different frequency may be designated. Two additional monitoring wells shall be installed

between the Site and MW-02s. All the monitoring wells shall be sampled during the first sampling event. If no COCs above RGs are detected in the medium and deep monitoring wells, then only the shallow monitoring wells shall be sampled for the remaining five year period. If contaminants are detected above RGs in these new wells or in the other monitoring wells (besides MW-06s or MW-02s), on a consistent basis, at any time in the future, this remedy will be re-evaluated. This remedy may also be re-evaluated, if the detections in MW-06s or MW-02s continue to increase significantly. In addition, groundwater samples from the shallow monitoring wells located downgradient of the solidified material shall be analyzed for the soil COCs and

sulfate for the first two years. If the soil COCS (that are different from the groundwater COCs) are detected in the wells, then the wells will continue to be sampled and analyzed for the soil COCs, and the remedy may be re-evaluated.

8.0 STATUTORY REQUIREMENTS

The U.S. EPA and SCDHEC believe that this remedy will satisfy the statutory requirements of CERCLA § 121, 42 U.S.C. § 9621, and NCP § 300.430, 40 C.F.R. § 300.430, of providing protection of human health and the environment, attaining Applicable or Relevant and Appropriate Requirements (ARARs) of other environmental statutes, and will be cost-effective. Sections 8.1 through 8.5 below analyze the statutory requirements for this Site.

8.1 Protection of Human Health and the Environment

The selected remedy provides protection of the public health and environment through Monitored Natural Attenuation-of the residually contaminated groundwater. For a detailed analysis of this requirement, see Section 6.3(1) of this Amendment.

8.2 Attainment of the Applicable or Relevant and Appropriate Requirements (ARARs)

Remedial actions performed under CERCLA must comply with all ARARs. All alternatives considered for the Geiger Site were evaluated on the basis of the degree to which they complied with these requirements. The selected remedy will comply with all ARARs.

8.3 Cost Effectiveness

The remedy selected in the 1987 ROD is currently estimated to be $1.33 million. Natural Attenuation of the contaminated groundwater is currently estimated at $34,000, and therefore, is the more cost effective remedy compared to the original remedy.

8.4 Utilization of Permanent Solutions and Alternative Treatment Technology or Resource Recovery Technologies to the Maximum Extent Practicable

U.S. EPA believes the selected remedy is the most appropriate cleanup solution for the contaminated groundwater at the Geiger Site and provides the best balance among the evaluation criteria for the remedial alternatives evaluated. This remedy provides

effective protection in both the short and long-term to potential human and environmental receptors, is readily implementable, and is cost effective.

Monitored Natural Attenuation of the contaminated groundwater represents a permanent solution which will effectively reduce and/or eliminate hazardous substances into the environment.

8.5 Preference for Treatment as a Principal Element

This alternative does not include active treatment, however, it will effectively prevent contaminants from posing a threat to human health and the environment.

APPENDIX A

RECORD OF DECISION, JUNE 1987

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

GEIGER (C&M OIL) SITE
CHARLESTON COUNTY, SOUTH CAROLINA

JUN 01 1987

Prepared By:

U.S. Environmental Protection Agency
Region IV
Atlanta, Georgia

RECORD OF DECISION

Remedial Alternative Selection

SITE: Geiger (C&M Oil)
Hollywood, Charleston County, South Carolina

DOCUMENTS REVIEWED:

- Remedial Investigation Raport, Geiger (C&M Oil) Site
- Feasibility Study, Geiger (C&M Oil) Site
- Summary of Remedial Alternative Selection
- Comunity Responsiveness Summary
- Staff Recommendations and Reviews

DESCRIPTION OF SELECTED REMEDY:

GROUNDWATER

- Extraction of contaminated groundwater
- Onsite treatment of extracted groundwater
- Discharge of treated groundwater to off-site stream
- Excavation of contaminated soil on the site
- Groundwater remediation will be performed until all water contaminated above the cleanup goals specified in the attached Summary of Alternative Selection are reached

SOIL

- Onsite thermal treatment of excavated soil to remove organic contaminants
- Solidification/stabilization of thermally-treated soil, if necessary to reduce mobility of metals
- Backfilling of excavated areas with treated soil, followed by grading and covering with gravel

- Soil cleanup goals will be developed during remedial design; the volume of soil to be treated will be dependent upon these goals

- During remedial design, solidification/stabilization (S/S) will be reviewed to determine it S/S alone will achieve the remedial action goals. Presently, data and information is not available to justify utilizing S/S at this time. However, if such data and information is available during the pre-design activities, this data will be used to reevaluate the present alternative under a second operable unit.

DECLARATIONS

Consistent with the Comprehensive Environmental Response; Compensation, and Liability Act of 1980 (CERCLA), the Superfund Awndments and Re-authorization Act of 1986 (SARA), and the National Oil and Hazardous Substances Contingency Plan (40 CER Part 300), I have determined that the extraction and treatment of groundwater and the excavation, onsite thermal destruction, stabilization/solidification, and backfilling of contaminated soils at tne Geiger (C&M Oil) site is a cost-effective remedy which uses alternative technologies and solutions to the maximun extent practicable, and provides adequate protection of human health and the environment. The selected action will require no further operation and maintenance activities, other than monitoring.

EPA will fund ninety percent of the cost of implementing this remedial action, and the State of South Carolina will fund the remaining ten percent. EPA will fund ninety percent of the costs of the first year of monitoring following conpletion of remedial activities. The State will fund the remaining ten percent; and will fund one-hundred percent of the costs of monitoring following this period.

The State of South Carolina has been consulted on the selection of this remedy, and concurs with the selected remedial action.

I have also determined that the action being taken is appropriate when balanced against the availability of trust fund monies for use at other sites.

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GEIGER (C&M OIL) SITE
CHARLESTON COUNTY, SOUTH CAROLINA

1.0 INTRODUCTION

The Geiger (C&M Oil) site was proposed for inclusion on the National Priorities List (NPL) in Update Number 1, September 1983, and ranks 588 out of 703 NPL sites. The Geiger site has been the subject of a remedial investigation (RI) and feasibility study (FS) performed by the Region IV REM II contractor, Camp, Dresser & McKee, Inc. (CEM). The RI report, which examines air, sediment, soil, surface water, and groundwater contamination at the site, was issued July 1, 1986. The FS, which develops and examines alternatives for remediation of the site, was issued in draft form to the public on January 9, 1987.

This Record of Decision has been prepared to sumnarize the remedial alternative selection process and to present the selected remedial alternative.

1.1 SITE LOCATION AND DESCRIPTION

The Geiger (C&M Oil) site is located in central Charleston County, South Carolina, approximately ten miles west ot the city ot Charleston, along Highway 162 (Figure 1). The site is in a sparsely populated rural area. About ten residences are located adjacent to the site to the east and northeast. The population in the immediate site area is estimated at forty persons. Several small businesses are located within one-half mile of the site along Highway 162. The town of Hollywood is approximately four miles west of the site.

Land use in the vicinity of the site is predominantly mixed coniferous and deciduous forest. Estuarine streams and their associated tidal wetlands are located approximately one mile to the north and south of the site. There are no major industries or other sources of employment nearby. Agricultural lands and borrow pits are scattered within a one-mile radius of the site.

The site comprises a five-acre area of very little topographic relief. Elevations on the site range from approximately fifteen to thirty feet above mean sea level. Surface water drainage is into two onsite ponds and to the west and northwest toward the Wallace River (Figures 2 and 3) which flows into the Stono River. A marshy area is found west of the site, and sensitive wetland environments are located in the Wallace River vicinity. These wetlands are a critical habitat supporting several federally listed endangered and threatened species.

Several lagoons were reconstructed on the site between 1969 and 1971 for use in a waste oil incineration process. These unlined lagoons covered a total area of approximately 5,000 square feet, and their bottoms were

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at or near the groundwater surface. The lagoons were filled with waste oil, and were later covered with local soils. The site is presently being used for equipnent storage by a pile driving company.

1.2 SITE HISTORY

In March 1969 the South Carolina Pollution Control Authority (SCPCA) permitted Adams Run, Services, Inc. to incinerate waste oil at what is now the Geiger site. Sometime between 1969 and 1971, eight unlined lagoons, each approximately one foot deep and covering a total area 50 feet wide by 100 feet long, were constructed for the purpose of holding waste oil in connection with the incineration process.

In late 1971 in response to complaints from area residents, SCPCA ordered that all incineration and waste deposition activities at the site be stopped, and the owner was to take action to prevent spillage, leakage, or seepage of oil from the site.

In Aprii 1974 a nearby property owner complained to the Charleston County Health Department (CCHD) about oil overflowing from the lagoons on the site. CCHD investigated and ordered the site closed, citing evidence of recent oil dumping and overflowing oil. C&M Oil Distributors, Inc. then purchased all reclaimable oil on the site and submitted recovery plans to the South Carolina Department of Health and Environmental Control (SCDHEC) There is no reply from SCDHEC on record.

In December 1979, SCDHEC requested C&M Oil to provide information on their plans for cleaning up the site. C&M Oil replied that they were unable to recover the waste oil and that they were not obligated to clean the site.

EPA Region IV began investigating the site in February 1980. Samples from two monitoring wells installed downgradient of the site contained organic conpounds and metals which were also detected in the waste pits. Residential wells upgradient of the site were sampled, but no organic compounds. were detected. Metals in these residential samples were at background levels. Waste oil in the lagoons was found to contain chemicals which are similar to those associated with automotive crankcases, brake fluids, and degreasing compounds. The total quantity of waste on the site was estimated at 149,600 gallons, the equivalent of 2992 55-gallon drums. The site was ranked using the Hazard Ranking System MRS), and received a score of 32.37.

The site was purchased in March 1982 by George Geiger, who is the present owner. Mr. Geiger proposed excavation and disposal of contaminated soil in the lagoons, but no final approval was given by SCDHEC.

In 1983 Mr. Geiger filled the lagoons with local soils, and the site has been used since then for the storage of equipment used by his company,

Pile Drivers, Inc.

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The Gaiger (C&M Oil) site was placed on the National Priorities List on September 8, 1983. EPA issued a work assignment in October 1984 to the REM II contractor, Camp, Dresser & McKee, Inc., to pertorm a remedial investigation and feasibility study of the site. This task was assigned to C.C. Johnson& Malhotra, P.C., of Silver Spring, Maryland, a REM II team member. The final RI report was issued July 1, 1986, and the draft FS was released to the public January 9, 1987.

The objectives of the site investigation were:

- To determine the extent of contamination of the shallow aquifer;
- To characterize the hydraulic characteristics of the shallow aquifer;
- To determine the lateral extent and depth of soil contamination on the site;
- To determine whether contamination has migrated off-site via surface water runoff; and
- To determine if air contamination from the site is occurring.

The purpose of the feasibility study was to develop and examine remedial alternatives for the site, and to screen these alternatives on the basis of protection ot human health and the environment, cost-eftectiveness, and technical implementability. In accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments, and Reauthorization Act of 1986 (SARA) alternatives in which treatment would permanently and signiticantly reduce the volume, toxicity, or mobility of the hazardous substances at the site were preferred over those alternatives not involving such treatment.

Further investigation was performed in February 1987, to search for drums which were reported to be buried on the site. This investigation was in response to comments made at a public meeting held to discuss the remedial alternatives under consideration. No buried drums were discovered on or near the site.

2.0 ENFORCEMENT ANALYSIS

The Geiger (C&M Oil) site was added to the National Priorities List (NPL) in September 1983 and EPA assumed lead responsibility for the site at that time. An EPA contractor completed a potentially responsible party search in February 1984. Notice letters were sent out to potentially responsible parties in October 1984. Since no viable PRPs were found, EPA proceeded to conduct the RI/FS itself. the RI/FS commenced in July

1985.

3.0 CURRENT SITE STATUS

3.1 HYDROGEOLOGIC SETTING

The Geiger (C&M Oil) site lies in the Atlantic Coastal Plain physiographic province. The uppermost aquifer at the site is a surficial, unconfined aquifer,, approximately 40 to 50 feet thick, composed of clean to silty, tine to medium sand with some mud lenses. Depth to the water surface varies seasonally, reaching a minimum of one foot below the ground surface. Groundwater flow across the site is generally to the west and northwest, discharging to surface waters in the wetlands of the Wallace River.

A hydraulic conductivity of 6.7 feet per day was determined using a rising head test. Assuming an average porosity of 41 percent for medium to fine sand aquifers, and a hydraulic gradient of 0.003, a velocity of 0.05 feet per day was calculated for groundwater flow. At this rate, groundwater at the site would have moved approximately 300 feet since waste was deposited on the site sixteen years ago.

Groundwater in the surficial aquifer has been classifed as Class 1 ground-water under EPA Groundwater Protection Strategy (GWPS) because it is highly vulnerable to contamination and it discharges into wetlands inhabited by endangered species. The Soutn Carolina Department of Marine Resources and the U.S. Fish and Wildlife Service have identified Bald eagles in the area, and reported a likelihood of Wood stocks and American alligators in the wetlands. As Class I groundwater, a high degree of protection would be afforded the aquifer, and very stringent clean-up goals must be met.

Groundwater in the surficial aquifer is also a source of drinking water for residents living near the site. Approximately ten homes immediately upgradient of the site have wells supplied by this aquifer. Several residential wells are also located one mile or less downgradient of the site. The aquifer classification and clean-up goals are discussed in more detail in Section 4.0.

This surficial aquifer is underlain by the Cooper Marl which acts as a confining layer in the area, separating the surficial aquifer from lowver formations. The Cooper Marl is estimated to be 15 to 60 feet thick and overlies several Tertiary formations. These formations are predominantly pure to very impure limestone in the upper part of the section, and sand, silt, and clay in the lower part. Below the Cooper Marl are additional sand, silt, and clay formations down to the basement rock, which is well indurated sedimentary and igneous rock or pre-Cretaceous age.

3.2 SOIL CONTAMINATION

Soils at the site are predominantly sandy throughout their profile, and possess rapid permeability. The area of highest soil contamination is in the oil stained area shown in Figure 4, where the former lagoons were located.

Soil contamination was found to a lesser degree in other areas shown in this figure. Contaminants include various organic compounds, PCB-1254, and heavy metals (Lead, Mercury, Chromium). The contaminants and the

maximum concentrations detected in soil on the site are shown in Table 1.

The depth of soil contamination is estimated to be five teet in the oil stained area and one foot in other areas of the site indicated in Figure 4. The depth of contamination in the oil-stained area was estimated on the basis of historical and visual evidence. Samples could not be obtained below a depth of two feet because of the high groundwater level. The contaminated soils are believed to behave as a source material, contributing contamination to the ground-water.

3.3 SURFACE WATER AND SEDMIENT CONTAMINATION

Lead was detected at elevated concentrations in two surface water samples from the swamp located northwest of the site, and elevated levels of Lead were found in four sediment samples from this area. This contamination is probably the result of past spills or of surface water runoff into the swamp. Most run-off from the site would be intercepted by the onsite ponds which showed no elevated levels of contaminants; however, limited off-site surface migration may be presently occurring. This swamp is not associated with the Wallace River wetlands, and is not considered to be a critical habitat as the wetlands are.

3.4 GROUNDWATER CONTAMINATION

The approximate extent of groundwater contamination is shown in Figure 5. Groundwater from the onsite shallow well, MW-4S (Figure 5), was found to be contaminated with several organic compounds. Benzene was detected at 25 ug/l, which is above the proposed Maximun Contaminant Level (PMCL) Of 5 ug/l. Toluene was detected at the proposed MCL (PMCL) of 2000 ug/l. Several other organic compounds were detected above background levels, as shown in liable 2. Background conditions are represented by MW-1, located hydraulically upgradient of the site.

Contaminants were detected at levels above background concentrations in well cluster M -5. Although not above appropriate standards, these concentrations indicate migration of contaminated groundwater off-site.

Arsenic was detected at 66 ug/l, which is above the MCL of 50 ug/l, in MW-2D. The presence of metals other than Arsenic was not confirmed be cause of sediments introduced into same samples. These sediments could be the source of the metals detected in M -5 and M -6.

Soil in the oil-stained area shown in Figure 4 is in contact with the groundwater. This contaminated soil is considered to be a source material, continually introducing contamination into the groundwater.

TABLE 1

MAXIMUM CONCENTRATIONS OF CHEMCIALS DETECTED
IN SURFACE SOIL SAMPLES
GEIGER (C&M OIL) SITE
CHARLESTON, SOUTH CAROLINA

CHEMICAL	CONCENTRATION (ug/kg)	BACKGROUND RANGE
Benzo(a)Anthracene	560	ND

Benzo(a)Pyrene	240	ND
Benzo(Band/orK) Fluoranthene	2000	ND
Chrysene	1200	ND
PC6 (Aroclor 1254)	4000	ND
1,1-Dichloroethane	9.6	ND
Toluene	460	ND
1,1,1-Trichloroethane	36	ND
Trichloroethylene	230	ND
Ethylbenzene	17	ND
Lead	740 mg/kg	3.9 - 8 mg/kg
Mercury	1.3 mg/kg	ND
Chromium	1100 mg/kg	3.6 - 4.5 mg/kg

ND - Not Detected

TABLE 2

CONTAMINANTS DETECTED IN MONITOR WELLS
GEIGER (C&M OIL) SITE
CHARLESTON, SOUTH CAROLINA

WELL NUMBER	CONTAMINANT	CONCENTRATION (ug/l)
MW 1S	Arsenic	6
MW 1M	Arsenic	8
	Chloroform (1)	5J
MW 1D	Di-n-Octylphthalate	3J
	Chloroform (1)	32
MW 2S	Chloroform (1)	20
MW 2M	Bronodichloromethane (1)	1J
MW 2D	Dimethyl Phthalate	11
	Chloroform (1)	22
	Benzene	0.8J
	Arsenic	66
MW 3S	Arsenic	42
	Di-n-Octylphthalate	3J
	Chloroform (1)	14
MW 3M	Chloroform (1)	2J
	Bis(2-ethylhexyl) Phthalate (2)	1200
MW 3D	Chloroform (1)	8
MW 4S	1,2-Dichlorobenzene	2J

	Naphthalene	18
	Isophorone	1J
	Benzoic acid (2)	18J
	2-Methylphenol	32
	4-Methylphenol	71
	2-Methyl naphthalene	8J
	Chloroethane	250
	1,1-Dichloroethane	130J
	trans-1,2-Dichloroethylene	53J
	Benzene	25J
	Toluene	2000
	Total Xylenes	25J

TABLE 2 (continued)

CONTAMINANTS DETECTED IN MONITOR WELLS
GEIGER (C&M OIL) SITE
CHARLESTON, SOUTH CAROLINA

WELL NEMBER	CONTAMINANT	CONCENTRATION (ug/1)
MW 4M	Benzoic acid (2)	4J
	Chloroform	1J
	Benzene	0.5J
MW 4D	Chloroform (1)	7J
	Benzene	0.4J
MW 5S	2,4-Dimethylphenol	20
	Benzene	5J
	Toluene	1J
	Lead (3)	53
MW 5M	Not Detected	
MW 5D	1,1-Dichloroethene	3J
	Chloroform (1)	20
MW 6S	Toluene (3) (4)	5.3
	Lead (3) (2)	250
	Cadmiun (3) (4)	13
MW 6M	Not Detected	
MW 6D	Not Detected	

(1) - Found in drilling water
(2) - Laboratory contaminant or natural degradation product
(3) - Sediment in sample
(4) - Compounds not found in duplicate sample

J - Estimated value

3.5 RECEPTORS

Receptors of contaminants on and near the Geiger (C&M Oil) site may be exposed via four different routes: Air, soil, groundwater, and surface water. Both environmental and human receptors have been identified.

The primary human receptors are onsite workers and residents who may come into contact with contaminants through inhalation of dust generated by wind erosion and, vehicle traffic, and through direct dermal contact with contaminated soil. Ingestion of contaminated soil is also possible, especially if children were to play on the oil-stained area.

Potential human receptors identitied under future-use scenarios include those identified above, as well as those who may ingest or otherwise come into contact with groundwater which could be produced fran onsite wells. No producing wells are present within the groundwater contamination plume at this time, but development of this site could lead to the placement of wells for human use. Users of groundwater from off-site wells are also potential receptors, as contaminated groundwater could migrate to residential wells if no remedial action is taken.

Environmental receptors include aquatic life coming into direct contact with or ingestirig surface water in the onsite ponds, the discharge stream, the oily pit on the site, and the marshy area near the site. Plants and amphibians may contact sediments in the marshy area near the site, and wildlife may ingest or contact contaminated soil in the oily area.

The environmental receptors of greatest concern are endangered species in the wetlands of the Wallace River. Groundwater from the site discharges into these wetlands, and contaminants may affect wetlands wildlife by this route. Contaminated groundwater has not yet reached these wetlands, but may eventually migrate to this area if not remediated.

3.6 WALLACE RIVER WETLANDS

Wetlands of The Wallace River have been identified as a sensitive habitat which may be affected by the Geiger (C&M Oil) site. These wetlands, snown in Figure 1, are located north and west of the site, within a two-mile radius of the site.

The following Federally listed endangered species were determined by the U.S. Fish and Wildlife Service to possibly occur in the area of influence of the site: Bald eagle (Haliaeetus leucocephalus), Wood stork (Mycteria americana), Red-Cockaded woodpecker (Picoides borealis). The American alligator (Alligator mississippiensis) is a threatened species which may also occur in this area. These species are all protected under the Endangered Species Act as amended by Public Law 97-304. Additionally, several plants, amphibians, and birds are "status review" species which are not legally protected at this time, but may be listed as endangered or threatened in the future. These species are identified in correspondence contained in Appendix A.

The South Carolina Department of Marine Resources has identified Bald eagles in the Wallace River wetlands. Adult plumage birds have been spotted, and nesting is expected to be confirmed soon.

These wetlands may be impacted by the site because the surficial aquifer discharges into the wetlands. It is this surficial aquifer which is contaminated at the Geiger site. Contaminated groundwater was determined to be migrating off-site in a generally westerly and northwesterly direction. Althougn contaminated groundwater has not reached the wetlands, contaminated groundwater may migrate to that area if not remediated.

Under the EPA Groundwater Protection Strategy, groundwater in this surficial aquifer at the Geieger site has been classified as Class I groundwater

because it discharges into a sensitive environment, the Wallace River wetlands, within a two-mile radius of the site.

4.0 CLEANUP CRITERIA

The extent of contamination was defined in Section 3.0, Current Site Status. Tnis section examines the relevance and appropriateness of water quality criteria under the circumstances of release of contaminants at this site. Based upon criteria found to be relevant and appropriate, the minimum goals of remedial action at this site have been developed.

4.1 GROUNDWATER REMEDIATION

In determining the degree of groundwater cleanup, Section 121(d) of the Superfund Amendments and Reauthorization Act of 1986 (SARA) requires that the selected remedial actions establish a level or standard of control which complies with all "applicable and relevant or appropriate regulations" (ARARs).

Groundwater in the surficial aquifer is classified as Class I under draft guidelines for groundwater classification under the EPA Groundwater Protection Strategy (GWPS). Class I groundwater includes that which is highly vulnerable to contamination because of the hydrogeological characteristics of the aquifer, and that which is ecologically vital in that the ground water discharges to an area that supports a unique habitat. Groundwater in the surficial aquifer discharges into wetlands of the Wallace River within the Classification Review Area, encompassing a two-mile radius of the site. The South Carolina Department of Marine Resources has documented the use of these wetlands as a feeding area for the Bald eagle, which is on the national endangered species list (see Section 3.6). Adult plumage birds have been identified, and it is expected that nesting will be confirmed soon. The U.S. Fish and Wildlife Service has noted the likelihood of the Bald eagle, Wood stork, and Red-Cockaded woodpecker in these wetlands; all are endangered species.

The EPA GWPS advises that the value to society of Class I groundwater supports restoration of this contaminated groundwater to levels protective of human health and the environment. Several contaminants were detected at elevated levels, as shown in Table 2. Based upon groundwater classification, remediation of the groundwater to reduce contaminants to levels protective of human health and the environment would be necessary. Groundwater cleanup goals given in Table 3 meet these requirements.

The surficial aquifer at the Geiger (C&M Oil) site is also a current source of drinking water. Nine residential water-supply wells are located upgradient of the site within the two-mile Classification Review Area. Several residential wells are located downgradient of the site within this area, approximately three-quarters of a mile west of the site. These wells are completed in the surficial aquifer and are a present source of drinking water. RCRA regulations require clean-up of contaminated groundwater to background levels or MCLs for certain listed contaminants. The presence of contaiminants at elevated levels in groundwater at the Geiger site will require treatment to reduce contaminants to appropriate levels as specified in Table 3.

TABLE 3

GROUNDWATER CLEANUP GOALS
FOR INDICATOR CHEMICALS

GEIGER (C&M OIL) SITE

INDICATOR CHEMICAL	MAXIMUM DETECTED (ug/1)	GROUNDWATER CLEANUP LEVEL (ug/1)	CRITERIA
Benzo (a) Pyrene	ND	0.003	b
Benzo (a) Anthracene	ND	0.003	b
Benzo (b and/or k) Fluoranthene	ND	0.003	b
PCB (Aroclor 1254)	ND	0.0079	b
Benzene	25	1.2	b
Trans-1,2-Dichloroethylene	53	70	a
Chromiun	ND	50	d
Lead	53	50	d
Toluene	2000	175	c
1,1-Dichlorobenzene	2	15.8	c
1,1-Dichloroethane	130	5	e

CRITERIA

a - Proposed Recommended Maximun Contaminant Level (PRMCL or MCLG)
Federal Register, Vol. 50, No. 219, Novemter 13, 1985, 46935
b - Equivalent to 10 -5 cancer risk
c - Aquatic Life Chronic Toxicity Value
d - Maximum Contaminant Level (MCL)
e - Required CLP detection level

Future exposure to contaminated groundwater was estimated based on the possibility of a well being placed on the site and producing water containing the maximm levels of contaminants which were detected in monitoring wells during the remedial investigation. Lifetime cancer risks were calculated under these assumptions for the indicator chemicals identified in the Public Health Evaluation (PHE). An acceptable lifetime risk is considered to be 10 -6. Larger values present an unacceptable risk from exposure. Lifetime risks, as developed in the PHE, are above the 10 -6 criteria. Because Section 121 of SARA requires consideration of potential as well as current groundwater use, the levels of contaminants in the groundwater must be reduced to acceptable levels.

The conclusion of the above discussion is that a no-action alternative for groundwater would be out of compliance with section 121 of SARA, which requires clean-up of contaminated groundwater to levels which are protective of human health and the environment. Classification of the groundwater and the potential future use of the groundwater indicates that

present contaminant levels in the groundwater are not acceptable.

Indicator chemicals were used to establish cleanup qoals for groundwater. Indicator chemicals were selected on the basis of which chemicals pose the greatest potential health risk at the Geiger site. These indicator chemicals include those developed in the Public Health Evaluation. Toluene and 1,1-Dichlorobenzene were included because maximum concentrations for these compounds have been established based on aquatic life chronic toxicity values.

For carcinogenic contaminants, a 10 -5 risk level was deemed appropriate for groundwater remediation. EPA's draft "Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites" (October 1986) specifies that groundwater remediation should achieve a level of protection in the 10 -4 to 10 -7 excess cancer risk range, with 10 -6 being used as a point of departure. Groundwater in the contaminated surficial aquifer is not used by human receptors immediately downgradient of the site, and natural attenuation will lower contaminant concentrations before qroundwater migrates from the site to existing residential wells or sensitive wetlands. Therefore, a 10 -5 risk level is sufficient for protection of humain health and the environment. A higher risk level would not be acceptable because of the possiblity that wells may be placed near the site. The Geiger site is in a lightly populated area, but residences are located near the site.

Levels presented as groundwater cleanup goals are based on four criteria: Proposed recommended maximum contaminant levels (PRMCLs); 10 -5 cancer risk for carcinogens; maximum contaminant levels (MCLs) established under the Safe Drinking Water Act; and aquatic life chronic toxicity values. Indicator chemicals, maximum concentrations detected in groundwater at the Geiger site, and the cleanup goals for these chemicals are presented in Table 3.

Specific quantitative data for all polyaromatic hydrocarbons (PAHs) is not available, so all carcinogenic PAHs are considered to have a carcinogenic potency equivalent to that of Benzo(a)pyrene.

This forms the basis of the cleanup goal for Benzo(a)anthracene and Benzo(b and/or k)fluoranthene. The sum of all carcinogenic PAHs should not exceed a 10 -6 risk level.

The PRMCL for Benzene is 5 ug/l, but the cleanup goal of 1.2 ug/l represents the 10 -6 cancer risk. The PRMCL incorporates consideration of available technology and the practical quantitation level for routine laboratory analysis.

Based on limited data, the EPA Environmental Criteria and Assessment Office concluded that 1,1-Dichloroethane may have the potential for carcinogenic activity in experimental animals. However, data were inadequate for quantitative risk assessment. Therefore, the cleanup goal will be to the lowest level practical, represented by the required CLP detection limit.

4.2 SOIL REMEDIATION

The Public Health Assessment in the RI Report determined that risks to human health as a result of exposure to onsite contaminants via inhalation, ingestion, and dermal contact are at acceptable levels under present-use conditions at the site. However, under a future-use scenario in which the site may be developed, an undue risk might be posed from exposure to contaminants in the soil. Remediation or institional controls will be

necessary to assure that an increased risk to human health is not posed in the future.

Contaminants remaining in the soil following groundwater remediation may, over time, leach into the groundwater. A model was developed to calculate contaminant concentrations in soil at the Geiger site that would not result in future exceedences of grouWwater cleanup goals. These soil contaminant concentrations for indicator chemicals are shown in Table 4 and are considered to be preliminary soil cleanup goals.

These preliminary goals were developed using limited data, and will be subject to refinement during remedial design. If information gathered during design allows more accurate development of cleanup goals, these levels will be revised accordingly.

The purpose of developing the preliminary goals was to determine the need for and the extent of soil remediation. As Table 4 indicates, several of the indicator chemicals are above the soil protective levels. If no soil remediation was implemented, leaching of contaminants from the soil into the groundwater would occur, and contaminant levels in the groundwater could exceed groundwater cleanup goals.

The areas shown in Figure 4 contain contaminants in excess of the protective levels in Table 4. Soil in these areas must be treated to reduce contaminants to levels at or below the preliminary cleanup goals.

The development of the prelimary soil cleanup goals is discussed in more detail in Appendix C.

4.3 SWAMP REMEDIATION

Off-site migration of metals has occurred into the swamp area west of the site. Although lead was detected above aquatic lite chronic toxicity values in surface water in the swamp, no adverse environmental effects have been noted to date. The contaminant levels in the swamp are expected to gradually decline, as migration of contaminants is not likely to be occurring at the present time. Most surface run-off from the contaninted soil is captured by the on-site ponds.

The swamp area will not be remediated because adverse environmental impacts associated with excavation of these areas would be greater than benefits which would be attained. Excavation of contaminated sediments would require clearing the vegetative cover and would disrupt the habitat and feeding grounds of a wide variety of wildlife in this swamp. The benefits to be obtained by swamp remediation would be exceeded by the adverse environmental impacts which would be realized. Thus, it was concluded that remediation of this area is not necessary.

TABLE 4

PRELIMINARY
SOIL CLEANUP GOALS
FOR INDICATOR CHEMICALS

GEIGER (C&M OIL) SITE

INDICATOR	MAXIMUM DETECTED	CLEANUP GOAL

CHEMICAL	(ug/kg)	(ug/kg)
Benzo (a) Pyrene	240	1,070
* Benzo (a) Anthracene	560	140
* Benzo (b and/or k) Fluoranthene	2000	170
* PCB (Aroclor 1254)	4000	1,050
Benzene	ND	14.4
Trans-1,2-Dichloroethylene	ND	76
* Chromiun	1100 mg/kg	3.7 mg/kg
* Lead	740 mg/kg	166.5 mg/kg
Toluene	460	971
1,1-Dichlorobenzene	ND	497
* 1,1-Dichloroethane	9.6	2.78

ND - Not Detected

* - Maximum detected concentration is greater than the preliminary cleanup goal

5.0 ALTERNATIVES EVALUATION

The purpose of remedial action at the Geiger (C&M oil) site is to mitigate and minimize contamination in the soils and groundwater, and to reduce potential risks to human health and the environment. The following clean up objectives were determined based on regulatory requirements and levels of contamination found at the site:

- º To protect the public health and the environment from exposure to contaminated onsite soils through inhalation, direct contact, and erosion of soils into surface waters and wetlands;
- º To prevent off-site movement of contaminated groundwater.
- º To restore contaminated groundwater to levels protective of human health and the environment.

An initial screening of applicable technologies was performed to identify those which best meet the criteria of Section 300.68 of the National Contingency Plan (NCP). Following the initial screening of technologies, potential remedial action alternatives were identified and analyzed. These alternatives were screened and those which best satisfied the cleanup objectives, while also being cost eftective and technically feasible, were developed further.

Table 5 summarizes the results of the screening process. Each of the ranaining alternatives for soil and groundwater remediation was evaluated based upon cost, technical feasibility, institutional requirements, and

degree of protection of public health and tne environment. A cost summary is presented in Table 6.

5.1 GROUP A ALTERNATIVES - GROUNDWATER REMEDIATION

Alternative A-1: Groundwater Extraction, Optional Flocculation/ Sedimentation, Air Stripping, and Disposal

This alternative would treat groundwater at the site by removing volatile organic compounds (VOCs) - Groundwater would be treated to cleanup goals established in Section 4.

All monitoring wells would be sampled and analyzed during or prior to remedial design. Flocculation/sedimentation and filtering would be added to the treatment system if metals are detected at levels which would pose a risk to human health, or at levels which could be toxic to wildlife.

Groundwater would be pumped from several onsite walls at a rate of 60 gallons per minute (gpm) - If flocculation/sedimentation is used, the water would be put into a storage tank. Lime and a polymer would be added to water taken from the tank, resulting in aggregation and settlement of insoluble metal contaminants in the water.

TABLE 5

TECHNOLOGIES CONSIDERED FOR SCREENING
GEIGER (C&M OIL) SITE
CHARLESTON, SOUTH CAROLINA

Possible Technologies	Eliminated (E) or Retained (R)	If Eliminated Reason for Doing So
I. Groundwater Technologies		
A. Groundwater Containment		
1. Slurry Wall	R	
2. Grout Curtains	E	More expensive and less effective than slurry walls
B. Groundwater Recovery		
1. Pumping (Extraction Wells)	R	
2. Subsurface Drains	E	Hydraulic conductivity may be high
C. Groundwater Treatment		
1. Flocculation/Sedimentation	R	
2. Filtration	R	
3. Air Stripping	R	
4. Spray Irrigation	R	
5. Activated Carbon Adsorbtion	R	
6. Ion Exchange/Sorptive Resins	R	
7. Reverse Osmosis	E	Expensive, dilute waste stream
8. Biological Treatment	R	

Possible Technologies	Eliminated (E) or Retained (R)	If Eliminated Reason for Doing So
D. Groundwater Disposal		
1. Discharge to Surface Water	R	
2. Reinjection	E	Complex and expensive compared to surface discharge
3. Pump to Local Wastewater Treatment Plant	R	

TABLE 5 (continued)

Possible Technologies	Eliminated (E) or Retained (R)	If Eliminated Reason for Doing So
II. Soil Technologies		
1. Extraction (Soil Flushing)	E	Not applicable to waste characteristics
2. Solidification/Stabilization	R	
3. Attenuation	E	Not applicable to site characteristics
4. Immobilization	E	Unknown reliability and effectiveness
5. Incineration	R	
6. Capping	R	
7. Vegetative Cover	R	
8. Excavation and off-site Disposal	R	
9. Partial Excavation with on-site Disposal	R	
10. On-site Contaiment/Encapsulation	R	

TABLE 6
SUMMARY OF PRESENT WORTH COSTS
GEIGER (C&M OIL)SITE
CHARLESTON, SOUTH CAROLINA

REMEDIAL ALTERNATIVES	CAPITAL COST $1000	PRESENT NORTH O&M COST $1000	TOTAL PRESENT WORTH COST $1000
GROUNWATER ALTERNATIVES:			
A-1 Extraction, Air Stripping and Disposal (1)	392 (756)	1,334 (1,474)	1,726 (2,230)
A-2 Extraction, Flocculation/ Sedimentation, Filtration, Carbon Adsorption, and Disposal	930	1,573	2,503

A-3 Extraction and Treatment at POTW	833	670	1,504
A-4 Slurry Wall and Cap	4,328	626	4,954
SOILS ALTERNATIVES:			
B-1 Cap	567	405	972
B-2 Vegetative Cover	214	405	619
Gravel Cover	256	397	653
B-3 Partial Excavation and Cap	614	405	1,019
B-4 Partial Excavation and			
Vegetative Cover	261	405	666
Gravel Cover	312	397	710
B-5 Excavation, On-site Incineration, and Solidification/Stabilization	5,191	367	5,558
B-6 Excavation and Off-site Disposal	3,910	367	4,277
NO ACTION	0	0	0
NO ACTION WITH MONITORING	0	367	367

(1) Numbers in parentheses include cost for flocculation/sedimentation.

The water would spread over plastic media in the column as it falls, while air blown upward through the column removes the volatile contaminants by mass transfer. The treated groundwater would be discharged to the stream west of the site.

The recommended alternative is for extraction, treatment, and discharge of groundwater. Extraction and discharge will be as outlined above, but the actual treatment system will be chosen as a result of treatability studies to be performed on contaminated groundwater from the site.

The volume of contaminated groundwater is estimated to be approximately 62 million gallons. Pumping would continue until the indicator chemical concentrations are at or below the cleanup goals specified in Table 3.

Alternative A-2: Groundwater Extraction, Optional Flocculation/ Sedimentation, Carbon Adsorption, and Disposal

This alternative includes treatment of extracted groundwater by floccula-tion and sedimentation to remove metals if, during pre-design sampling of monitoring wells, it is determined that metals are present above the groundwater cleanup goals, or that discharge of water containing untreated metals would present a threat to the environment. The carbon adsorption process would remove volatile and extractable organics. All organic contaminants would be removed to levels at or below cleanup goals estab-lished in Section 4. If used, flocculation/ sedimentation would also remove metals to levels below cleanup goals. Groundwater would be pumped from several on-site wells at a rate of 60 GPM to a storage tank. If the flocculation/ sedimentation option is used, lime and a polymer would be added to water taken from the storage tank, resulting in aggregation and settlement of insoluble metal contaminants in the water. This water would then pass through columns of granular activated carbon (GAC), which

would adsorb organic compounds in the water. Treated water would be discharged to the stream west of the site.

The estimated volume of water to be pumped under this alternative is 62 million gallons.

The recommended alternative is for extraction, treatment, and discharge of groundwater. Extraction and discharge will be as outlined above, but the actual treatment system will be chosen as a result of treatability studies to be performed on contaminated groundwater from the site.

Alternative A-3 - Groundwater Extraction and Treatment at Privately-Owned Treatment Works (POTW):

This alternative would involve treatment of groundwater at an existing local publicly-owned treatment works (POTW). Groundwater would be pumped from several on-site wells at a rate of 60 GPM and would be conveyed by an iron pipeline to a sewer line six miles from the site.

pumped from several on-site wells at a rate of 60 GPM and would be conveyed by an iron pipeline to a sewer line six miles from the site.

A risk of spreading contamination would exist, as leaks could occur in the pipeline or sewer, allowing untreated groundwater to escape into the environment. The POTW does not currently accept industrial waste and has indicated a reluctance in accepting waste from the Geiger (C&M Oil) site. Also, alternative A-2 (above) provides the same level of remediation, at relatively little cost increase, without the environmental risks associated with off-site transport of contaminated groundwater. For these reasons, this alternative has been rejected.

Alternative A-4 - Slurry Wall and Cap

This alternative would not treat groundwater, but would reduce the migration of contamination by preventing groundwater movement through the area enclosed by tne slurry wall, and by reducing infiltration of surface water Contaminated groundwater would remain on-site.

A circunferential slurry wall of low permeability would be placed around the perimeter of the groundwater contamination plume. The wall would extend into the Cooper Marl, a formation of low-permeability which lies at a depth of about 50 feet. A impermeable cap, consisting of 24 inches of compacted clay, a 20-mil synthetic liner, 12 inches of gravel, a geotextile fabric layer, and an 18-inch vegetated topsoil layer, would be placed over the area bounded by the slurry wall. This cap would greatly reduce infiltration of precipitation, and lateral and vertical migration of contaminated groundwater would be impeded by the slurry wall and the Cooper Marl, respectively.

Soil remediation would not be required under this alternative, as the areas of highest soil contamination would be covered by the cap, preventing the spread of contaminated soils. However, areas of lesser soil contamination would remain in place and contaminated groundwater outside of the slurry wall would continue to migrate off-site.

This alternative has been rejected because contaminated groundwater and soils would remain on-site, and not all groundwater would be remediated. In addition, the expected effective life of the slurry wall and cap is only thirty years. Should failure occur, contaminants would be free to migrate

off-site.

5.2 GROUP B ALTERNATIVES - SOIL REMEDIATION

Alternative B-1: Cap

This alternative would involve construction of a three-layered cap over the area of highest soil contamination, thus reducing the risk of human and environmental contact with contaminated soils. Infiltration of surface water and the resultant production of leachate would be reduced.

A cap conforming to RCRA guidelines would be constructed over a 1.2-acre area of soil contamination. This would be the oil-stained area on the site. The cap would consist of a two-foot thick compacted clay layer, a twenty-mil synthetic liner, and a one-foot thick gravel drainage layer.

Overlying these would be geotextile fabric and eighteen inches of topsoil. The topsoil would be graded to a two percent slope and vegetated to promote run-off and control erosion. Human and environmental contact with contaminated soil beneath the cap would be eliminated. Infiltration of surface water would be greatly reduced due to the design of the cap.

This alternative is eliminated from consideration because areas of soil contamination outside the oil-stained area would still subject human and environmental receptors to the risk of contact with contaminants. Also, groundwater would continue to be contaminated as it flows laterally across the site, coming into contact with the soil beneath the cap. Contaminants would remain on-site and continue to act as a source of groundwater contamination. Also a permanent remedy is practicable and meets the requirements of SARA, Section 121.

Alternative B-2: Vegetative or Gravel Cover

Under this alternative, a vegetative or gravel cover would be placed over the highly-contaminated oil-stained area, preventing human and environmental contact with the covered soil.

A vegetative cover would be constructed by placing an 18-inch layer of topsoil over the oil-stained area. This topsoil would be graded to a 2-percent slope and vegetated. A diversion ditch would be constructed at the higher end of the cover to reduce run-on of surface water from other areas of the site.

An optional cover of gravel rather than vegetated topsoil would allow current use of the site for equipment storage to continue.

Both types of cover are eliminated from consideration because contaminated soil would remain on-site and would act as a source of continuing contamination of groundwater. Contaminated soil outside the oil-stained area would remain in its current condition, posing a potential risk of exposure to human and environmental receptors. Infiltration of precipitation would continue, with the possibility of resultant leachate generation. Groundwater would continue to come into contact with contaminated soil beneath the cover. Also, a permanent remedy is practicable and meets the requirements of SARA, Section 121.

Alternative B-3: Partial Excavation, On-Site Disposal, and Cap

This alternative would involve placement of contaminated soils which are outside the oil-stained area onto the oil-stained area, and then capping the area.

Approximately 53,000 cubic feet of contaminated soil would be excavated and placed over the contaminated soil in the oil-stained area. This area is about 1.2 acres in size. A cap conforming to RCRA standards, as described in Alternative B-1, would be constructed over this area.

This cap would prevent human and environmental contact with any contaminated soil on the site. However, contaminants would still be present as a source material, contacting and contaminating the groundwater. This is not a permanent remedy, whereas a permanent remedy which meets the requirements of SARA, Section 121, is practicable at this site. Therefore, this aiternative is eliminated from consideration.

Alternative B-4: Partial Excavation, on-Site Disposal, and Vegetative or Gravel cover

Under this alternative, the oil-stained area would be covered with contaminated soils troin other areas of the site. A vegetative or gravel cover would be placed over these soils in the manner described under Alternative B-2. Human and environmental contact with contaminated soil would be eliminated.

This alternative is eliminated from consideration because contaminants would remain on the site as a source material, contributing to groundwater contamination. Soils beneath the site would continue to contact ground water, and precipitation would continue to infiltrate the soils, producing contaminated leachate. Also, a permanent remedy meeting the requirements of SARA, Section 121, is practicable at this site.

Alternative B-5: Excavation, On-Site Thermal Destruction, and Stabilization/ Solidification

This alternative would consist of excavation of all contaminated soils on the site, thermal destruction of these soils in an on-site mobile thermal destruction unit, treatment of the organic contaminants in soil with stabilization/solidification reagents, and then backfilling excavated areas with the treated soil. Organic contaminants would be destroyed, and metals would be stablized so they will not migrate.

Approximately 11,300 cubic yards of contaminated soil would be excavated on the site from the areas shown in Figure 4. The oil-stained area would be excavated to a depth of about 5 feet, while the additional areas would be excavated to a depth of about 1 foot. Field analyses or a local lab would be utilized during excavation to determine actual depths so that all soils contaminated above the clean-up goals would be removed.

The recommended alternative for groundwater remediation includes groundwater extraction througn the use of on-site wells; thus the soils would be dewatered prior to excavation.

A mobile thermal destruction unit would be used to destroy organics in the excavated soils. Following thermal treatment, the soils would be treated by a stabilization/solidification (S/S) process which would reduce the mobility and solubility of the metals in the soils. The S/S process involves the use of chemical reagents which react with the metal

ions to form a chemically and mechanically stable solid.

The treated soil would be placed back into the excavated areas, and the site covered with gravel to allow present use of the site to continue. This alternative is a permanent remedy which would destroy or reduce the mobility of all hazardous materials in the soils on the site. No risk of human or environmental contact would exist atter remediation, and the threat of groundwater being contaminated by the source material would be greatly reduced or eliminated. This alternative would not require long term maintenance. For these reasons, this alternative is the recommended remedy for soil contamination at the Geiger (C&M Oil) site.

The preliminary soil cleanup goals given in Table 4 will be subject to refinement during remedial design as additional data concerning degradation, attenuation, and migration of contaminants is developed. The final cleanup goals will be such that contaminant levels remaining in the soil following treatment will not raise contaminant levels in the groundwater above the cleanup goals established in Section 4.

Alternative B-6: Excavation and Off-Site Disposal

With this alternative, all contaminated soil on the site would be excavated and disposed of at an off-site RCRA-approved hazardous waste landfill. Approximately 11,300 cubic yards of soil would be excavated from the areas shown in Figure 4. The oil-stained area would be excavated to a depth of approximately 5 feet, with additional areas being excavated to about one foot. Actual depths would be determined by use of a local or mobile lab during excavation to assure that all contaminated soil above cleanup goals is removed. Dewatering would be accomplished by use of the recommended groundwater alternative, which includes pumping from on-site wells. Excavated soil would be carried to an approved hazardous waste landfill. The nearest approved landfill which has been identified is GSX located at Pinewood, South Carolina. This location is approximately 90 miles fran the site.

This alternative would result in the prevention of human and environmental contact with contaminated soil at the site. However, tnis is not a permanent remedy, in that contaminated soil would be transferred from one location to another. Under Section 121 of SARA, tnis will be the least-preferred remedy when a permanent remedy is feasible. Because a viable permanent remedy is available, this alternative is eliminated from consideration.

NO-ACTION ALTERNATIVE

Under the no-action alternative, groundwater and soil would not be remediated. Monitoring is an option which may or may not be implemented. This alternative is presented to provide a base-level action, against which other alternatives may be compared.

This no-action alternative would not be protective of human health and the environment. Contaminated groundwater could eventually migrate to residential wells downgradient of the site, and could discharge into the Wallace River wetlands, which are inhabited by endangered species.

The no-action alternative is rejected for these reasons, and because it would not comply with SARA requirements to reduce the volume, mobility, or toxicity of hazardous substances when treatment to accomplish this is feasible.

6.0 RECOMMENDED ALTERNATIVE

6.1 DESCRIPTION OF RECOMMENDED REMEDY

The recommended alternatives for remediation of groundwater and soil contamination at the Geiger (C&M Oil) site include extraction, treatment, and discharge of groundwater; and excavation, on-site thermal treatment, stabilization/solidification, and backfilling of contaminated soils on the site.

Treatability studies will be performed to determine the groundwater treatment system or systems which will be used. The system(s) may include air stripping, carbon adsorption, flocculation/sedimentation or other appropriate groundwater treatment technologies. All or any combination of these may be included to assure that the indicator chemicals are reduced to concentrations at or below the clean-up goals specified in Table 3. The treatment system(s) will also be selected and designed to assure that concentrations of contaminants not included as indicator chemicals are reduced in the same proportion as the indicator chemical concentrations.

Contaminated soil will be treated by use of an onsite thermal destruction unit to destroy organic compounds in the soil. All soil containing indicator organic chemicals at levels above the cleanup goals will be excavated and thermally treated. Where indicator metals are above the cleanup goals following treatment, the soil will also under go stabilization /solidification. Following treatment, the soil will be placed back into the excavation and graded. At selected intervals during excavation, soil samples will be taken and will be analyzed by a local or mobile lab to determine the limits of excavations. It should be noted that the action levels in Table 4 are preliminary goals and are subject to refinement during remedial design.

Before thermal treatment is implemented, solidification/stabilization will be evaluated to determine its effectiveness in achieving the remedial action goals.

These recommended alternatives meet the requirements of the National Oil and Hazardous Substances Contingency Plan (NCP), 40 CFR 300.68 (j), and the Superfund Amendments and Reauthorization Act of 1986 (SARA). This remedy permanently and significantly reduces the volune of hazardous substances in the groundwaters, and reduces the volume and/or mobility of contaminants in the soil. No long-term maintenance will be required for this remedy.

These alternatives are cost-effective when compared with other applicable alternatives. Alternative A-3 has a high risk of spreading contamination; A-4 does not remove source material and has an estimated effective life of only 30 years. Alternatives B-1, B-2, B-3, and B-4 would leave source material on-site, in contact with the groundwater; B-6 would remove contaminated soil from the site, but would landfill it off-site. Alternative B-5 is considered, cost-effective because it would be a permanent remedy, providing the greatest protection to human health and the environment.

6.2 OPERATION AND MAINTENANCE

This remedy will require approximately 29 months for groundwater treatment and 19 months for soil remediation, following design and contract award. The total implementation time for these remedies will be approximatelv 3

years. When the remedy is completed, no long term operation and maintenance (O&M) will be required.

Long term groundwater monitoring will be required to assure the effectiveness and permanence of the soil and groundwater remedies. Monitoring wells and residential wells on and off the site will be included in the monitoring program. Groundwater sampling will be conducted quarterly for the first two years, and yearly after that. Thirty years of monitoring was included in cost estimates, but this period may be significantly less.

6.3 COST OF RECOMMENDED ALTERNATIVES

Capital cost for groundwater remediation is $392,000 to $930,000, and system operating costs are $1,334,000 to $1,573,000. Long-term operation & maintenance (O&M) of this remedy is not required, but qroundwater monitoring will be necessary to assure the permanence of this remedy. The present worth cost of monitoring was calculated to be $367,200 based on thirty years of annual monitoring. The actual monitoring period may be less if no unacceptable contamination levels are detected during the initial years following site remediation. The total present worth cost of this alternative is $1,736,000 to $2,503,000.

Capital cost for soil remediation is $5,191,000 including actual system operation. No long-term operation and maintenance will be required following site remediation. Long-term groundwater monitorinq will be required to assure that this remedy is permanent. Monitoring costs are given with the groundwater costs, and will not be duplicated for soil treatment.

The total present worth cost of this remedy, including both soil and ground water remediation and, long-term monitoring, is $6,917,000 to $7,693,400.

Cost-sharing responsibilities of the State of South Carolina are discussed in Section 8.0.

6.4 SCHEDULE

The planned schedule for remedial activities at the Geiger (C&M Oil) site is as follows:

May	1987	Approve Record of Decision
October	1987	Begin Remedial Design
July	1988	Complete Remedial Design and Begin Mobilization
January	1989	Complete Mobilization, Equipment Installation, and Testing
July	1991	Complete Remedial Activities

6.5 FUTURE ACTIONS

Following completion of remedial activities, no further action will need to be performed to maintain this remedy. The recommended alternatives are a permanent remedy and will require no long term operation or maintenance. Long term groundwater monitoring will be required to assure the effectiveness of this remedy.

6.6 CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

Remedial actions performed under CERCLA must comply with all applicable federal and state regulations. All alternatives considered for the Geiger

(C&M Oil) site were evaluated on the basis of the degree to which they complied with these regulations. The recommended alternatives were found to meet or exceed all applicable environmental laws, as discussed below.

º Resource Conservation and Recovery Act

The recommended remedy for soil contamination includes incineration, which is regulated under the Resource Conservation and Recovery Act (RCRA). Incineration will be conducted entirely onsite are is therefore exempt fron all Federal, State, and local permitting requirements, as specified in SARA, Section 121(e)(1). However, all substantive, regulations governing incineration will be complied with, even though a formal permit is not required.

º Clean Water Act

Contaminants have been detected in a marshy area near the site, but adverse environmental impacts associated with remediating these areas would be greater than any benefits which might be obtained. Soil remediation is aimed at source control, and implementation of the recommended alternative would result in an end to further contamination of surface water.

º Floodplain Management Executive Order 11988

This site does not lie within a floodplain and thus is not subject to the requirements of E.O. 11988.

º Department of Transportation

Transport of hazardous substances is regulated by the Department of Transportation (DOT). It residual material results from the groundwater treatment system, it will be shipped to an off-site disposal facility. If tests on the material indicate the need for disposal in a hazardous waste facility, DOT regulations governing its shipment will be followed.

º Occupational Safety and Health Administration

A health and safey plan will be developed during remedial design and will be followed during field activities to assure that regulations of the Occupational Safety and Health Administration (OSHA) are followed.

º Safe Drinking Water Act

Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act were found to be relevant and appropriate to remedial action at the Geiger site. The cleanup goals for groundwater established in Section 4 use MCLs or proposed MCLs as the goal when an MCL or PMCL has been set, unless a more stringent criteria results in the use of a lower concentration limit.

º National Pollutant Discharge Elimination System

Discharge of treated groundwater is part of the recommended remedial alternative. This discharge will meet effluent limit requiraments of the National Pollutant Discharge Elimination System (NPDES). Aquatic life chronic toxicity values, which are used in the NPDES permitting system, were used in determining the groundwater cleanup goals in Section 4, unless a more stringent criteria was used to set a lower concentration. Bench-scale or pilot tests, including bioassays, will be conducted where

appropriate during design of this alternative to set effluent limits, and to optimize the groundwater treatment system so that these effluent limits are met.

º Endangered Species Act

The recommended remedial alternative is protective of species listed as endangered or threatened under the Endangered Species Act. Requirements of the Interagency Section 7 Consultation Process, 50CFR, Part 402, will be met. The Department of Interior, Fish and Wildlife Service, will be consulted during remedial design to assure that endangered or threatened species are not adversely impacted by implementation of this remedy.

º Ambient Air Quality Standards

The incineration and groundwater treatment systems will be designed and monitored to assure that air emissions meet all State and federal standards.

º State Drinking Water Standards

Maximum contaminant levels established by State of South Carolina regulations are adopted from those of the federal Safe Drinking Water Act, and will be met as discussed above.

7.0 COMMUNITY REIATIONS

A public meeting was held on January 29, 1987, at the Hollywood Town Hall to discuss the remedial alternatives developed in the Feasibility Study. EPA did not indicate a preferance for a particular alternative. Comments from the public did not favor any particular alternatives, and none of the alternatives were opposed by anyone. No comments in regard to any of the alternatives were received during the three-week public comment period which ended February 19, 1987.

The public did show a desire for remediation of the site, and seemed to favor removal or destruction of contamination found in the soil and groundwater. No opposition from the public is expected if the recommended remedial alternative is implemented.

A Responsiveness Summary has been prepaied to summarize community concerns and EPA's community relations activities.

8.0 STATE INVOLVMENT

As required by CERCLA, Section 104(C), the State must assure payment of ten percent of all costs of remedial action. Remedial action has been defined in SARA as including all construciton and implementation activities until site remediation is completed. Activities required to maintain the effectiveness of the remedy following completion of the remedial action is considered operation and maintenance (O&M). If surface water or groundwater treatment is part of the remedy, only the first ten years of such treatment will be considered as remedial action; the remaining period of treatment will be a part of O&M activities. The State is required to pay 100 percent of all O&M following completion of the remedial action. EPA and the State may enter into an agreement whereby EPA would fund 90% of O&M costs, for a period not to exceed one year, until the remedy is determined to be operational and functional.

A summary of State cost-sharinq obligations for the recommended alternative at the Geiqer (C&M Oil) site is shown in Table 7. The State of South Carolina's cost-sharing responsibility would be in the range of $809,600 to $876,600.

The State of South Carolina has been consulted on the selection of this remedy. The State has concurred, but has pointed out that their funds for cost-sharing are limited. Although the State presently has funding to cover their share of this remedial action, they are concerned about funding problems on future remedial actions at other NPL sites in the state. The State's letter of concurrence may be found in Appendix B.

TABLE 7

STATE COST-SHARING OBLIGATIONS
GEIGER (C&M OIL) SITE

	EPA	STATE	TOTAL
DESIGN	1,116,700-1,224,100	0	1,116,700-1,224,100
CAPITAL COSTS	4,019,900-4,406,600	446,700-489,700	4,466,600-4,896,300
IMPLEMENTATION	869,800-1,085,100	96,600-120,600	966,400-1,205,700
FIRST-YEAR MONITORING	101,000	11,200	112,200
LONG-TERM MONITORING	0	255,100	255,100
TOTAL	6,107,400-6,816,800	809,600-876,600	6,917,000-7,693,400

APPENDIX B

RECORD OF DECISION AMENDMENT, JULY 1993

Amendment to the

Record of Decision

Summary of Remedial Alternative Selection

Geiger (C & M Oil) Site

Rantowles, South Carolina

Prepared by:
U.S. Environmental Protection Agency
Region IV
Atlanta, Georgia

DECLARATION FOR THE AMENDMENT TO THE RECORD OF DECISION

SITE NAME AND LOCATION

Geiger (C & M Oil) Site
Rantowles, South Carolina

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Geiger (C & M Oil) Site, in Rantowles, South Carolina, chosen in accordance with CERCLA,, as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this Site.

The State of South Carolina concurs on the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD Amendment, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

This decision addresses the principal threat remaining at the Site by treating the most highly contaminated soils and

ground-water. The soils will be treated in situ using solidification/stabilization, such that the Site's soils will not require any long-term management. The contaminated ground-water will be extracted, treated on-site, and disposed of either on-site or off-site. Treated ground-water will be disposed of either to an on-site stream which flows off-site or to the same steam off-site.

The major components of the selected remedy include:

- In Situ Stabilization/Solidification of contaminated soils; and

- Extraction of contaminated ground-water, on-site treatment of extracted ground-water, and discharge of treated ground-water to either an on-site or off-site stream.

DECLARATION

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that

are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this Site. This remedy does satisfy the statutory preference for treatment as a principal element of the remedy. However, because waste, although treated, is being left on-site, leachate from the stabilized/solidified soil must be monitored.

Because this remedy leaves wastes on-site, a review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

<IMG SRC 98087H>

Amendment to the Record of Decision

Summary of Remedial Alternative Selection
Geiger (C & M Oil) NPL Site
Rantowles, South Carolina

1.0 INTRODUCTION

This Amendment to the Record of Decision (1987 ROD) provides a current status of activities that have been completed since the ROD was signed for the Geiger (C & M Oil) Site on June 1, 1987, documents the Agency's decision to use Solidification/ Stabilization (S/S) alone to treat the contaminated soil instead of incineration followed by S/S, and incorporates the ROD by reference (Appendix A). All other provisions of the 1987 ROD

issued by EPA not inconsistent with the ROD Amendments included herein remain in full force and effect.

1.1 Site Location and Description

The Geiger Site (the Site) is located along Highway 162 in Rantowles, Charleston County, South Carolina, approximately ten (10) miles west of the city of Charleston (Figure 1). The Site is in a sparsely populated rural area. Approximately ten (10) residences are located near the Site to the east and northeast. The population in the immediate Site area is estimated at forty (40) people. Several small businesses are located within a half (0.5) mile of the Site along Highway 162. The property covers a five (5) acre area of very little topographic relief, however, the Site area is approximately one and one-half (1.5) acres in size. This affected area is triangular in shape and is bounded on two sides by ponds, and on the third side by a small rise, approximately five (5) feet higher than the Site area. Elevations on the Site range from approximately fifteen (15) to thirty (30) feet above mean sea level.

1.2 Site History

On June 1, 1987, EPA selected a remedial alternative for the Geiger (C & M Oil) Site cleanup which included:

- recovery of contaminated ground-water with on-site treatment and discharge to an off-site stream;

- on-site thermal treatment of excavated soils to remove organic contaminants;

- Solidification/Stabilization (S/S) of thermally-treated soil to reduce mobility of metals;

<IMG SRC 98087I>

- During Remedial Design S/S would be reviewed to determine if S/S alone would achieve the remedial action goals; and

- During Remedial Design, soil cleanup goals would be refined.

A Potentially Responsible Party search conducted prior to the commencement of the Remedial Investigation/Feasibility Study (RI/FS) determined that there were no viable Potentially Responsible Parties. EPA, therefore, conducted the RI/FS and since the signing of the ROD on June 1, 1987, EPA has conducted additional field investigations in order to better characterize and define the extent of the soil contamination. The results of the analysis of the additional soil samples showed relatively low levels of organic contaminants of concern (COCs) and that lead and chromium were the primary COCs. During the development of the Remedial Design for the soil, treatability testing and modeling were conducted to determine if S/S alone would achieve the remedial action goals and to refine the soil cleanup goals (Table 1). Treatability studies, including the one performed by EBASCO, conducted on soils from the Site indicated that S/S alone

would meet the cleanup goals for the Geiger Site. The EBASCO Study can be found in the Administrative Record (See Section 3.0 "Community Relations"). The determined soil cleanup levels fall within EPA's acceptable risk range, are protective of human health and the environment, and will meet state water quality standards at the point of discharge. Based on the results of the additional soil samples, treatability studies, and because the revised remedy fundamentally changes the original remedy, the Agency has decided to amend the 1987 ROD pursuant to the National Contingency Plan (NCP), 40 C.F.R. § 300.435(c)(2)(ii).

1.3 Explanation of Fundamental Remedy Change

The 1987 ROD specified on-site thermal treatment of excavated soils to remove organic contaminants and S/S of the thermally treated soil to reduce mobility of the metals. The 1987 ROD also stated that during the Remedial Design, S/S would be reviewed to determine if S/S alone would achieve the remedial action goals. The 1987-ROD stated that the action levels in the ROD were preliminary goals and subject to refinement during the Remedial Design.

New information has been developed since the issuance of the 1987 ROD. Additional soil sampling has indicated that the levels of organic COCs were lower than previously described in the RI/FS reports and the area of significant contamination is smaller than originally thought. Extensive sampling has more precisely defined the location of the contamination and shown that the main soil contaminants are metals, which can be treated effectively using S/S alone. Therefore, based on the results of the site specific treatability studies, the contaminants that are

Table 1

TREATMENT CRITERIA

CHEMICAL

INDICATOR CHEMICAL	LEACHATE CRITERIA 1 (ug/l)
Benzo[a]pyrene	10
Benzo[a]anthracene	10
Benzo[b and/or k]fluoranthene	10
PCB (Arochlor 1254)	1
Benzene	5 [2]
trans-1,2-Dichloroethylene	100 [2]
Chromium	150
Lead	15
Toluene	1000 [2]
1,2-Dichlorobenzene	6

1,1-Dichloroethane	5 3

Notes:

1 Criteria is Action Level.

2 Leachate criteria equal National Primary Drinking Water Regulations latest and proposed Maximum Contaminant Levels.

3 Criteria is MCL for 1,2-Dichloroethane

Leachate Extraction Method: TCLP

PHYSICAL

Property	Pass/Fall Criteria
Unconfined Compressive Strength	50 psi
Flexible Wall Permeability	1 x 10 -5 cm/sec

currently found in the soil at the Site can be treated effectively by the process of S/S alone. In addition, based on current rates, incineration would be three to four times more costly than S/S alone. In summary, the contaminants currently at levels of concern at the Geiger (C & M Oil) Site can be treated effectively solely using S/S.

1.4 Explanation of Significant Differences

The 1987 ROD also stated that ground-water contamination would be treated on-site and that the discharge of the treated ground water would be to an off-site stream. Since the signing of the 1987 ROD, it has been determined that because a portion of the stream is on-site, discharge of the treated ground-water may be appropriate to either an on-site or off-site part of the stream. The on-site discharge would be to the same stream as off-site discharge and would meet the same substantive standards (ARARs) as would off-site discharge. If discharge is to the off-site part of the stream,, an NPDES permit would be required, but if discharge is to the part of the stream that is on-site, then the substantive requirements of the NPDES permit would be met, but the permit itself would not have to be obtained. Therefore, EPA does not consider the issue of discharge location to be a fundamental change to the 1987 ROD.

2.0 ENFORCEMENT ANALYSIS

A Potentially Responsible Party search was conducted in 1984 prior to the commencement of the RI/FS. It was determined that there were no viable Potentially Responsible Parties.

3.0 COMMUNITY RELATIONS

EPA prepared a Record of Decision (ROD) on June 1, 1987, taking into consideration the comments from the public and the results of the FS. The most environmentally sound and cost-effective remedy was then selected as a part of the ROD phase of the

Superfund process. EPA selected thermal treatment of the soil to remedy the organic contamination, S/S of the soil following thermal treatment to remedy the inorganic contamination, recovery of contaminated ground-water with on-site treatment and discharge to an off-site stream. EPA also stated that during the Remedial Design S/S would be reviewed to determine if S/S alone would achieve the remedial action goals. A public meeting was held in January 1987 in which all the alternatives were presented, although a preferred remedy was not chosen. An information repository was established and is located at the Hollywood Town Hall in Hollywood, South Carolina, near Rantowles.

This ROD Amendment was available for review and comment during the public comment period, May 25, 1993, until June 25, 1993, and will become part of the Administrative Record File, as required by CERCLA § 117, 42 U.S.C. § 9617,, and the NCP, 40 C.F.R. § 300.825(a)(2). No comments were received during the public comment period and no requests were received for an extension of the comment period or for a public meeting.

4.0 CURRENT SITE STATUS

4.1 Hydrogeology

Ground-water Contaminants

The current areal and vertical extent of ground-water contamination were delineated from several sources of information. The original source of information was from the Remedial Investigation (RI). Since that time, additional monitoring wells were installed in 1988. There are currently twenty-seven (27) permanent monitoring wells on-site and off site, located in clusters of two to three wells, which range in depth from approximately ten (10) to forty-five (45) feet below land surface. After the new monitoring wells were installed, these new wells and the wells installed during the RI were sampled. There also have been several additional sampling events since 1988; the last sampling event occurred during May 1992 through June 1992. During the 1992 sampling event, the permanent monitoring wells were sampled along with eleven (11) additional temporary monitoring wells that were installed further downgradient than the permanent wells, and at various locations on-site and upgradient.

Sampling and analysis of the Monitoring wells indicate the following:

Cadmium was detected above Maximum Contaminant Levels (MCLs) in well MW-6s in the earlier sampling events. It was not detected in the 1992 sampling event in any of the wells. Two metals which were consistently detected above MCLs in all the sampling events were the following:

Contaminant	Well No.	Maximum Level Detected	MCLs Federal/State)
chromium	MW-2s	7.8 mg/L	0.100 mg/L
lead	MW-6s	3.4 mg/L	0.015 mg/L

No contaminants of concern were detected during the last sampling event in 1992 in samples collected from the additional permanent monitoring wells located downgradient and north to northwest of the Site.

During the RI, organic contaminantst some of which exceeded MCLs, were detected primarily in one monitoring well (MW-4s). However, since the signing of the 1987 ROD, the results from five additional post-ROD sampling events have not shown any organics in this well. Only a few organics have been detected since that time, sporadically in the wells installed during the RI, but no organics were detected in the newer wells added in 1988. The types of organics and the levels detected -- mostly low and below MCLs -- varied with each sampling event and varied in each well.

Based on the sampling data, ground-water contamination has been found primarily in the water-table wells located in the surficial aquifer. The boundary of the contamination plume is defined by those wells in which no contaminants were detected or were not above background. The zone is bounded an the northwest side by wells MW-08 to MW-11, on the west side by well MW-12, on the southwest side by well MW-03, and on the south side by temporary well GT3BG2.

4.2 On-Site Soils

Since the 1987 ROD was signed, EPA has conducted additional field investigations in order to better characterize and define the extent of the soil contamination. The,last sampling event occurred in May 1992. The inorganics chromium and lead were detected in most of the samples from the Site area. Significantly high levels of the inorganics were detected, especially at and near the location of the old lagoons. The maximum chromium level detected was 6,275 mg/kg and the maximum lead level detected was 730 mg/kg. A few organics, primarily toluene and PCB, were detected in some of the samples collected from the Site area near the old lagoon. The maximum levels, respectively, of toluene and PCB detected in the soil samples were 144 mg/kg and 10 mg/kg. Most soil sample levels of toluene and PCBr however, were below 10 mg/kg and 1 mg/kg, respectively. The results of the various field investigations show the area needing treatment for soil contamination to be the triangular area described in Section 1.1 of this Amendment. This triangular area will be treated to a depth of ten (10) feet. Analytical results from the RI are in the Remedial Investigation Report. The analytical results from the additional field investigations are in the In-Situ Solidification /Stabilization of Contaminated Soil Remedial Design Report.

5.0 SUMMARY OF SITE RISKS

5.1 Public Health and Environmental Objectives

At the time the 1987 ROD was signed, there was no current public health threat to off-site residents and no significant risk to

on-site workers under the reasonable case scenario via dermal

contact. Health risks associated with exposure by inhalation were considered negligible. Nearby wells, which were located upgradient, had not been affected by Site contaminants. There are no nearby private wells located downgradient. Under the future use scenario where the Site is developed and private wells are installed, it was determined that soil remediation would be necessary to prevent further leaching of contaminants into the ground-water as well as recovery of the contaminated ground-water in order to meet the remedial action objectives.

The waters of the surficial aquifer have been classified as Class GB ground-water. Class GB aquifers are considered potential sources of drinking water and must be remediated to levels that do not adversely affect human health and the environment. Sampling data indicates that several contaminants in the ground-water plume exceed drinking water standards (chromium and lead). At the present time, all residents have access to municipal water. In addition to being classified as a Class GB aquifer, discharge of the untreated ground-water into the on-site ponds, which flow into an unnamed creek and thence into the Wallace River, may potentially have an environmental impact on plant and animal species in the various surface water bodies.

6.0 ALTERNATIVES CONSIDERED FOR SOIL REMEDIATION IN JUNE 1987 ROD

Soil remediation alternatives considered for the Geiger (C & M Oil) Site are listed in Table 2 along with the reasons certain alternatives were eliminated. For an in-depth analysis of the other soil alternatives considered, see pages 23 - 32 of the 1987 ROD.

6.1 Alternative Previously Selected For Soil

The selected remedy for soil, as specified in the 1987 ROD, was excavation, on-site thermal destruction, and Stabilization/ Solidification (S/S). The selection of this alternative is now being reevaluated because new information has been developed about the nature and extent of the contamination at the Site and changes in the relative costs of various remedies since the 1987 ROD.

Table

TECHNOLOGIES CONSIDERED FOR SCREENING
GEIGER (C & M OIL) SITE
RANTOWLES, SOUTH CAROLINA

Possible Technologies	Eliminated (E) or Retained (R)	If Eliminated Reason for Doing So
I. Soil Technologies		
1. Extraction (Soil Flushing)	E	Not applicable to waste characteristics
2. Solidification/Stabilization	R	
3. Attenuation	E	Not applicable to Site characteristics

4.	Immobilization	E	Unknown reliability and effectiveness
5.	Incineration	R	
6.	Capping	R	
7.	Vegetative Cover	R	
8.	Excavation and Off-Site Disposal	R	
9.	Partial Excavation with On-Site Disposal	R	
10.	On-Site Containment/ Encapsulation	R	

Table 2 (cont'd.)

Possible Technologies		Eliminated (E) or Retained (R)	If Eliminated Reason for Doing So
II.	Groundwater Technologies		
A.	Groundwater Containment		
1.	Slurry Wall	R	
2.	Grout Curtains	E	More expensive and less effective than slurry walls
B.	Groundwater Recovery		
1.	Pumping (Extraction Wells)	R	
2.	Subsurface Drains	E	Hydraulic conductivity may be high
C.	Groundwater Treatment		
1.	Flocculation/Sedimentation	R	
2.	Filtration	R	
3.	Air Stripping	R	
4.	Spray Irrigation	R	
5.	Activated Carbon Adsorption	R	
6.	Ion Exchange/Sorptive Resins	R	
7.	Reverse Osmosis	E	Expensive, dilute waste stream
8.	Biological Treatment	R	
D.	Groundwater Disposal		
1.	Discharge to Surface Water	R	
2.	Reinjection	E	Complex and expensive compared to surface discharge

3.	Pump to Local Wastewater Treatment Plant	R

6.2 Description of Alternative Currently Being Considered for Soil Remediation

Alternative 1	In-situ Stabilization/Solidification
Alternative 2	Excavation, on-site thermal destruction, Stabilization/Solidification

6.2.1 Alternative 1 - In-Situ Stabilization/Solidification

Alternative 1 consists of the treatment of affected soil in place by in-situ stabilization. This alternative involves the stabilization of soil to a depth of ten feet below land surface. During the performance of the Remedial Design, it was determined that in-situ stabilization would be more effective at the Site than ex-situ stabilization since the ground-water was very shallow, and because of dust and air emissions from excavation of the contaminated soil.

In-situ stabilization includes the use of deep soil mixing equipment that delivers stabilization reagents to the affected soils during mixing operations. The process involves auguring into the affected soils to the desired depth using hollow-stem augers. The hollow-stem augers overlap and can vary from two to five augers per assembly. A shallow soil mixing system also is available and uses a single, wide diameter auger rather than an assembly of overlapping augers. Treatment agents are introduced into the disturbed matrix through jets constructed in the auger. The reagents can be introduced in either a liquid or slurry form. A system such as this could consist of the following typical unit operations:

- Shallow Soil Mixing Assembly
- Reagent Containers and Feed Systems

Treatment duration will vary by depth and by the amount of mixing required to ensure adequate S/S. The treatment duration estimated for this Site is less than a year. Testing of the solidified treatment zones also will be necessary to ensure that performance requirements are being met. Low levels of organics possibly may volatilize during the treatment process, therefore, air monitoring equipment will be used. Treatability studies have been completed using Site soils and these studies showed that this alternative will effectively meet the remediation goals for both the metals and the organics.

For a detailed description of ARARs, see Sections 6.3(2) and 8.2

of this Amendment. The S/S alone treatment option is currently estimated at $3.2 million (1992).

6.2.2 Alternative 2 - Excavation, On-Site Thermal Destruction, Stabilization/Solidification

This alternative would consist of excavation of all contaminated soils on the Site (probably requiring a dewatering step), thermal destruction of the organic contaminants in the soil in an on-site mobile thermal destruction unit, treatment of the inorganic contaminants in the soil with S/S reagents, and then backfilling the excavated areas with the treated soil.

At the time the 1987 ROD was signed, the estimated cost of the soil remedy selected in the ROD was approximately $5.2 million. At this time, using the current estimated volume, the remedy selected in the 1987 ROD could cost approximately $10.0 to $12.0 million. The estimated time period for this alternative is greater than a year.

This alternative would destroy the organic contaminants and stabilize the metals so that they would not migrate. For an in-depth analysis of this alternative, including ARARs, see pages 30 - 31 of the 1987 ROD.

6.3 Comparative Analysis

This analysis will compare the alternatives, A-1 and A-2, for the nine evaluation criteria detailed in the National Contingency Plan (NCP). For a more detailed analysis of the remedy selected in the 1987 ROD, which has S/S as a component, see pages 30, 31, and 33 - 36 of the 1987 ROD.

1. Overall protection of human health and the environment - Both of the alternatives accomplish this criterion. Both of the alternatives are within Agency guidelines and would provide overall protection by reducing or controlling the threat by remediating the contaminated soil. Both alternatives would meet the remediation goals and be long-term protective of human health and the environment: A-1 by chemically and physically binding the organic and inorganic contaminants using S/S alone, and A-2 using thermal treatment to destroy the organic contaminants and S/S to bind the inorganic contaminants. The additional protection offered by in-situ S/S is further enhanced by the short-term protectiveness gained from treatment without excavation of waste materials, which would not have the air emission concerns associated with thermal treatment of soils.

2. Compliance with ARARs - Alternatives A-1 and A-2 would meet ARARs for soil and ground-water. No waiver from ARARs would be

necessary to implement either cleanup alternative.

ARARs for A-1 Soil Treatment

Currently, 40 C.F.R. Parts 60 and 61, 42 U.S.C. § 7401 et. seq, which include the National Emissions Standards for Hazardous Air Pollutants (NESHAPs), promulgated pursuant to the Clean Air Act § 101 et. seq, as amended, and the South Carolina Air Pollution Control Regulations and Standards, SC Reg. 61-62, promulgated pursuant to the Pollution Control Act, SC Code of Laws, 1976, as amended, do not apply to air emissions caused by mixing the soil in-situ with stabilization reagents. St Reg. 61-62 establishes limits for emissions of hazardous air pollutants and particulate

matter, and establishes acceptable ambient air quality standards within South Carolina. Because the selected treatment does not include thermal treatment of the soil as proposed by the 1987 ROD, no ARARs apply to air emissions caused by stabilizing the soil.

40 C.F.R. Part 261, Subpart C, Characteristics of Hazardous Waste, promulgated pursuant to the Resource Consetvation and Recovery Act (RCRA) § 3001, 42 U.S.C. § 6921, and SC Reg. 61-79.261, Subpart C, defines those solid wastes which are subject to regulations as hazardous waste. Because the wastes were not hazardous wastes, currently no RCRA regulations apply, including Land Disposal Regulations. However, confirmation sampling will be done to ensure that the Toxicity Characteristic Leaching Procedure (TCLP) requirements are not exceeded and thus no RCRA regulated hazardous wastes have been generated.

ARARs for Ground-Water

If the alternative to discharge treated ground-water on-site is chosen, the substantive requirements of the NPDES program will be met although no permit is required for on-site discharge of treated ground-water. If the off-site alternative to discharge ground-water is chosen, the substantive and administrative requirements of the NPDES program will be met and a permit will be obtained.

For an in-depth analysis of the application of ARARs to the original remedy which included S/S, see pages 35 - 36 of the 1987 ROD.

3. Long-term effectiveness and performance - Both of the alternatives would provide a permanent remedy for both organic and inorganic contaminants. Therefore, either alternative would meet this criterion and reduce the risk associated with soil contamination at this Site.

4. Reduction of toxicity, mobility, and volume - Both alternatives would reduce the toxicity and mobility of soil

contamination. Alternative A-1 would accomplish this by binding, both chemically and physically, the organic and inorganic contaminants. Alternative A-2 would destroy the organic contaminants and chemically and physically bind the inorganic contaminants. Both alternatives would prevent the threat of further degradation of the ground-water.

5. Short-term effectiveness - Alternative A-1 would provide short-term effectiveness. Emissions would be minimal since the remedy is in-situ and does not require excavation of the waste materials. Alternative A-2, however, would not be short-term effective because there would be air emissions from the thermal treatment unit and dust and volatilization of contaminants as a result of excavation of the soil. In addition, A-1 would be completed in less time than A-2 since A-2 would require additional time to excavate (including dewatering steps) return the soil following treatment, and thermally treat it.

6. Implementability - Both alternatives are technically

feasible. The reliability of in-situ stabilization equipment has been demonstrated at several sites. Implementation of the treatment process for Alternative A-1 has some level of technical problems that could lead to schedule delays, especially since the treatment reagents must be equally distributed throughout each treatment area. The primary uncertainty associated with in-situ stabilization is the variability of treatment throughout the treatment zone. This concerwill be addressed by requiring sufficient overlap between treatment areas and by sampling of the treated zone. This alternative will not require permitting or coordinating with other offices or agencies. Special drilling equipment capable of injecting treatment agents during drilling is required for in-situ stabilization, however, several commercial vendors offer the process. Alternative A-2 is a proven technology. Wastes would be fed into the thermal unit at a rate providing sufficient retention time for complete combustion of the organic contaminants. Air monitoring and analysis equipment would be needed to monitor scrubber effluent, solids residue, combustion gases, system pressure and temperature, and air flow rates.

7. Cost - Both of the alternatives are protective of human health and the environment. The costs associated with Alternative A-1 are less than the costs associated with Alternative A-2 and for this reason, Alternative A-1 is the most cost effective remedy.

8. State Acceptance - The State of South Carolina concurs with the S/S alone treatment alternative.

9. Community Acceptance - At the time the 1987 ROD was signed, many members of the community were quite vocal in criticizing the thermal treatment portion of the remedy. This information was

obtained from past articles in the newspaper and from conversations with local residents in the last year or two. They cited a history of exposure to contaminants from the incinerator that was previously located at the Site. There were no official comments submitted during the public comment period opposing the alternative selected in the 1987 ROD, however, during the public comment period EPA had not indicated a preference for a particular remedy in the proposed plan. Conversations with nearby residents in the recent past about Alternative A-1 indicated that the residents were not opposed to S/S only of the contaminated soil.

7.0 SELECTED REMEDY

Based upon consideration of the requireients of CERCLA, the detailed analysis of both alternatives, and public comments, EPA has determined that Alternative A-1 is the most appropriate remedy for the contaminated soil at the Geiger (C & M Oil) Site in Rantowles, South Carolina.

The selected remedy consists of the treatment of affected soil in place by in-situ stabilization. The area to be treated is the triangular area described in Section 1.1 of this Amendment. This area is bounded on two sides by ponds and on the third side by a small rise, approximately 5 feet higher than the Site area.

Testing of the solidified treatment zones also will be necessary to ensure that performance requirements are being met. Treatability studies have been completed using Site soils that showed this alternative effectively will meet the remediation goals for both the metals and the organics.

The selected remedy consists of the treatment of affected soil in place by in-situ stabilization. This alternative includes the use of deep soil mixing equipment that delivers stabilization reagents to the affected soils during mixing operations. The process involves auguring into the affected soils to the desired depth using hollow-stem augers. The hollow-stem augers overlap and can vary from two to five augers per assembly. A shallow soil mixing system also is available and uses a single, wide diameter auger rather than an assembly of overlapping augers. Treatment reagents are introduced into the disturbed matrix through jets constructed in the auger. The reagents can be introduced in either a liquid or slurry form.

8.0 STATUTORY REQUIREMENTS

The U.S. EPA and SCDHEC believe that this remedy will satisfy the statutory requirements of CERCLA § 121, 42 U.S.C. § 9621, and NCP § 300.430, 40 C.F.R. § 300.430, of providing protection of human health and the environment, attaining Applicable or Relevant and

Appropriate Requirements (ARARs) of other environmental statutes, will be cost-effective, and will utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Sections 8.1 through 8.5 below analyze the statutory requirements for this Site.

8.1 Protection of Human Health and the Environment

The selected remedy provides protection of the public health and environment through Solidification/Stabilization treatment of contaminated soil. For a detailed analysis of this requirement, see Section 6.3(l) of this Amendment.

8.2 Attainment of the Applicable or Relevant and Appropriate Requirements (ARAR'S)

Remedial actions performed under CERCLA must comply with all ARARs. All alternatives considered for the Geiger Site were evaluated on the basis of the degree to which they complied with these requirements. The selected remedy will comply with all ARARs. Although the selected treatment does not include thermal treatment of the soil as proposed by the 1987 ROD, the selected remedy does envision possible volatization of the low concentration organics when the soil is mixed with the stabilization reagents. Thus, confirmation sampling will be done to ensure that the air quality remains good and that no ARARs become applicable to the air aspect of the remedy. In addition, because the wastes were not hazardous wastes, no Resource Conservation and Recovery Act (RCRA) regulations apply. However, confirmation sampling will be done to ensure that the TCLP requirements are not exceeded and thus no RCRA regulated hazardous wastes have been generated.

Treated ground-water may be discharged on-site or off-site. If the on-site alternative is chosen, no NPDES permit is required, but the substantive requirements of the NPDES permit will continue to be in effect and these requirements will be met. The reason for the ground-water discharge location contingency is because EPA will not need access to discharge treated ground-water on-site. In addition, there is no difference in discharging the treated ground-water on-site as opposed to off-site because it is the same stream.

8.3 Cost Effectiveness

The remedy selected in the 1987 ROD now could cost $10.0 to $12 million. The Stabilization/Solidification alone treatment option is currently estimated at $3.2 million (1992), and therefore, is

the more cost effective remedy compared to the original remedy.

8.4 Utilization of Permanent Solutions and Alternative Treatment Technology or Resource Recovery Technologies to the Maximum Extent Practicable

U.S. EPA believes the selected remedy is the most appropriate cleanup solution for the contaminated soils at the Geiger Site and provides the best balance among the evaluation criteria for the remedial alternatives evaluated. This remedy provides effective protection in both the short and long-term to potential human and environmental receptors, is readily implementable, and is cost effective.

Stabilization/Solidification of the contaminated soil represents a permanent solution (through treatment) which will effectively reduce and/or eliminate mobility of hazardous wastes and hazardous substances into the environment.

8.5 Preference for Treatment as a Principle Element

Treatment of the contaminants will effectively prevent them from posing a threat by leaching to ground-water, and therefore, satisfies the preference for treatment.

APPENDIX C

PROPOSED PLAN FACT SHEET

<IMG SRC 98087J>

INTRODUCTION

This Fact Sheet has been prepared by the U.S. Environmental Protection Agency - Region IV (EPA) to amend the Record of Decision (ROD) issued for the Geiger (C & M CHI) Site on June 1, 1987 which was revised in a ROD Amendment issued on July 13, 1993. These two documents selected the following remedial alternatives for the Site, which included:

- Recovery of contaminated groundwater with on-site treatment and discharge to an on-site or off-site stream;

- Solidification/Stabilization (S/S) of contaminated soil to reduce the toxicity and mobility of the contaminants;

The purpose of this fact sheet is to propose a change in the remedial alternative selected for treatment of contaminated groundwater, and to change the contaminants of concern for groundwater. This reevaluation of the originally selected groundwater remedy is consistent with EPA's updating remedies reform. In addition, based upon additional sampling since the ROD and the first ROD Amendment, EPA is proposing Monitored Natural Attenuation to address the residual contaminated groundwater instead of recovery of contaminated groundwater with on-site treatment and discharge to an on-site or off-site stream, as selected in the ROD. EPA is also proposing to revise the contaminants of concern for the groundwater. All other provisions of the ROD issued on June 1, 1987 and the ROD Amendment issued on July 13, 1993, by EPA, not inconsistent with this ROD Amendment included herein, remain in full force and effect.

As the lead Agency for oversight of remedial activities at the Site, EPA has worked in conjunction with the South Carolina Department of Health and Environmental Control (SCDHEC). Through this support role, SCDHEC has reviewed this preferred alternative and concurs with EPA's recommendations. In accordance with Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), EPA is publishing this amended proposed plan to provide an opportunity for public review and comment on the revised cleanup option under consideration for the Site.

This fact sheet provides a current status of activities that have been completed since the ROD was signed for the Geiger (C & M Oil) "Site" on June 1, 1987 and the ROD Amendment on July 13, 1993, documents the Agency's decision to revise the contaminants of concern, and to use

monitored Natural Attenuation to address the residual contaminated groundwater instead of recovery and treatment, and incorporates the ROD and earlier ROD Amendment by reference. The original ROD and ROD Amendment are locaed in the Information Repository located at the Hollywood Town Hall, 3616 Highway 162, Hollywood, South Carolina, (803)889-3222.

SITE DESCRIPTION AND HISTORY

The Geiger Site is located along Highway 162 in Rantowles, Charleston County, South Carolina, approximately ten (10) miles West of the City of Charleston. The Site is in a sparsely populated rural area. Approximately ten (10) residences are located near the Site to the east and northeast. The property covers a five (5) acre area of very little

topographic relief. The Site area is approximately one and one-half (1.5) acres in size.

From 1969 to 1971, the Site was the location of a waste oil recycling and incineration facility. A series of eight waste oil lagoons, or pits, were used to contain the waste oil prior to the recycling or incineration process. Incineration activities at the Site stopped in 1971. The Site property was purchased in 1982 by Mr. George Geiger who filled in the lagoons so that the Site could be used to store construction equipment for his company.

The South Carolina Pollution Control Authority and the Charleston County Health Department began monitoring the Site in 1970 in response to complaints by nearby residents about odors from the Site. Two complaints, in 1971 and 1974 respectively, resulted in investigations by the Charleston County Health Department. It was determined that a potential health hazard existed at the Site. In 1980, the South Carolina Department of Health and Environmental Control (SCDHEC) and EPA conducted investigations at the Site and discovered that the waste oil residues in the pits were similar to substances associated with automotive crankcases, brake fluids, and degreasing compounds. EPA's sampling of private wells upgradient and one well downgradient from the Site, revealed no contamination; however, ground water near the waste oil lagoons was found to contain elevated metal concentrations and some volatile organic compounds (VOCs). In 1983, the Site was added to the Superfund National Priorities List (NPL).

In 1985, EPA began a Remedial Investigation of the Site, which was completed in July 1986. The RI determined that soil on the Site was

contaminated with lead, chromium, mercury, and polychlorinated biphenyls (PCBs). Further, metals, such as lead as well as VOCs and other organic compounds were found in the ground water beneath the Site. No contaminants were detected in residential wells.

Following the RI, a Feasibility Study was conducted. EPA then released a summary of the Feasibility Study, which presented the cleanup alternatives that were under consideration. After considering public comments received during the public comment period, EPA selected the cleanup alternative described in its June 1987 Record of Decision for the Site.

Since the signing of the ROD, EPA has collected additional groundwater samples. Of the twenty-seven monitoring wells sampled, only two wells continue to show any groundwater contamination. In addition, the only contamination detected was lead. No other COCs above clean-up standards, that were identified in the original ROD, have been detected in the monitoring wells during the last several sampling events. Based on the results of these additional samples, EPA has decided to propose an amendment to the June 1987 ROD.

EXPLANATION OF FUNDAMENTAL REMEDY CHANGE

The June 1987 ROD, specified recovery and treatment of contaminated groundwater, and discharge to a stream.

New information has been developed since the issuance of the 1987 ROD and 1993 ROD Amendment. First, the contaminated soils have been treated to prevent further leaching of contaminants to groundwater

above drinking law standards. In addition, groundwater samples from the latest sampling events, have indicated that there are no longer organic COCs in any monitoring wells and lead has been the only inorganic COC consistently detected above drinking water standards, and in only two out of approximately 27 monitoring wells. These two wells are not near each other, but on opposite sides of the site. In addition, the lead level his been decreasing in one of the two contaminated wells, and is near drinking water standards.

The other monitoring well has shown an increase in the lead concentration, however, temporary monitoring wells located between the site and this monitoring well, did not show any detections of lead. Cadmium has also been detected in this well, (but no other well, including the above mentioned temporary wells). Also, the level detected is not always in exceedance of its drinking water standard, and if so, only by a slight amount. In addition, this well is not located near any residents, but is in an undeveloped area.

It does not appear, based on the latest sampling data, that there is a definible "groundwater plume", but very localized contamination, extensively smaller in size than originally thought. In addition the cost of extracting and treating the groundwater is approximately forty times the cost of Monitored Natural Attenuation. Therefore, because the soil has been treated to prevent further leaching of contaminants to the groundwater, and because addtional sampling conducted by EPA shows groundwater contamination in only two very small localized areas, one area of which is raw drinking water standards, EPA believes that the most cost-effective means to address the remaining residual groundwater contamination is Monitored Natural Attenuation.

Because most of the COCs stated in the original 1987 ROD have not been detected in the monitoring wells in the latest sampling events, EPA is revising the COCs for the groundwater to include only those contaminants detected above drinking water standards in the latest, sampling events. The revised list of COCs will include the following contaminants and their respective Remedial Goals (RGs) which are based on drinking water standards: Lead - 15 ug/kg and Cadmium - 5 ug/kg. The groundwater will be sampled for all of the groundwater COCs, for

the first five years. At that time, the parameters will be revised to include only those that were detected in the groundwater during the five year period. This is expected to be inorganics only. Sampling of the groundwater will occur twice a year for the first two years, and annually for 3 years after this. At that time a different frequency may designated. Two additional monitoring wells shall be installed between the Site and MW-02s. All the monitoring wells shall be sampled during the first sampling event. If no COCs above RGs are detected in the medium and deep monitoring wells, then only the shallow monitoring wells shall be sampled for the five year period. If contaminants are detected above RGs in these new wells or in the other monitoring wells (besides MW-06s or MW-02s), on a consistent basis, at any time in the future, this remedy will be re-evaluated. This remedy may also be re-evaluated, if the detections in MW-06s or MW-02s continue to increase significantly. In addition, groundwater samples from the shallow monitoring wells located downgradient of the solidified material shall be analyzed for the soil COCs and sulfate for the first two years. If the soil COCs (that are different from the groundwater COCs) are detected in the wells, then the wells will continue to be sampled and analyzed for the soil COCs, and the remedy may be re-evaluated.

CURRENT SITE STATUS

Soil Contamination

The soil contamination at the Geiger Site has been addressed using Solidification/Stabilization which involved using cement in a reagent mixture. The area that was treated was triangular in shape, as was the old lagoon area, and was treated to a depth of approximately ten feet below land surface. The purpose for treating the soils was to prevent further leaching of contaminants to groundwater, thus protecting human health and the environment.

Groundwater Contaminants

The current areal and vertical extent of groundwater contamination were delineated from several sources of information. The original source of information was from the Remedial Investigation (RI). Since that time, additional monitoring wells were installed in 1998. There are currently twenty-seven (27) permanent monitoring wells on-site and off-site. These wells are located in dusters of two to three wells, which range in depth from approximately ten (10) to forty-five (45) feet below land surface. Current sampling data shows a significant decrease in the number of contaminants and area of groundwater contamination, compared to the information obtained during the RI/FS in 1986. Only one contaminant, lead, consistently exceeds its drinking water standard. Cadmium exceeds it's standard slightly, in one well, only some of the time. At the present time, all nearby residents have access to municipal water.

ALTERNATIVES CONSIDERED FOR GROUND-WATER REMEDIATION IN JUNE 1987 ROD

The present and proposed groundwater alternative being considered for the Geiger (C & M Oil) Site are listed below. For an in-depth analysis of the other groundwater alternatives originally considered, see pages 23 - 28 of the 1987 ROD.

Alternative Previously Selected For Groundwater

The selected remedy for groundwater, as specified in the 1987 ROD and 1993 ROD Amendment, was recovery of contaminated groundwater with on-site treatment and discharge to an on-site or off-site stream. The selection of this alternative is now being reevaluated as a result of additional information now known about the nature and extent of the contamination at the Site, and changes in the relative costs of various remedies since the ROD was signed in 1987.

DESCRIPTION OF ALTERNATIVES CURRENTLY BEING CONSIDERED FOR SOIL REMEDIATION

Alternative A-1
Monitored Natural Attenuation

Alternative A-2
Recovery of contaminated groundwater with on-site treatment and discharge to an on-site or off-site stream.

Alternative A-1 - Monitored Natural Attenuation

Alternative A-1 consists of Monitored Natural Attenuation to address the localized groundwater contamination. The area of groundwater

contamination his decreased significantly since the original ROD was signed in 1987. In one location the lead concentration has been decreasing, and is cuirently near MCLs. The other monitoring well has shown an increase in lead concentration, however, groundwater samples collected between this well and the site, have not shown any lead contamination. It does not appear that there is a definable "groundwater plume", but a very localized area of contamination, which is extensively smaller than originally thought. The well is not located near any residents, but on undeveloped land. In, addition, the soils have been treated to prevent firther leadiing of contaminants to groundwater. The Monitored Natural Attenuation option is currently estimated at $34,000.

This alternative would consist of allowing natural processes to address the groundwater contamination. Selected monitoring wells would be sampled periodically, as described above, to ensure protection of human health and the environment until the groundwater contamination is remediated.

Alternative A-2 - Recovery and Treatment of Groundwater

Recovery of contaminated groundwater with on-site treatment and discharge to an on-site or off-site stream. Extraction wells would be installed in the area of groundwater contamination and the groundwater would be recovered. The water would then go to an on-site treatment plant, which would treat the contamination. After treatment, the water would be discharged to an on-site or off-site stream nearby. The monitoring and extraction wells, along with the discharge point from the treatment plant, would be sampled periodically to ensure that the groundwater is being treated. The extraction and treatment of groundwater is currently estimated at $1.33 million.

COMPARATIVE ANALYSIS

This analysis will compare the Alternative, A-1 and A-2, for the nine evaluation criteria detailed in the National Contingency Plan (NCP). For a more detailed analysis of the remedy originally selected in the ROD, see pages 23 - 28 of the ROD.

1. Overall protection of human health and the environment - Both of the alternatives would provide overall protection by reducing the residual threat by addressing the contaminated groundwater. Both alternatives would meet the remediation goals and be long-term protective of human health and the environment: A-1 by allowing the natural attenuation process to address the lead in the groundwater, and A-2 by extracting and treating the lead contamination in the groundwater.

2. Compliance with ARARs - Alternatives A-1 and A-2 would meet ARARs for groundwater. No waiver from ARARs would be necessary to implement either cleanup alternative.

For an in-depth analysis of the application of ARARs to the original remedy which would apply to the current preferred remedy, see page 36 of the 1987 ROD. This would include the Safe Drinking Water Act.

3. Long-term effectiveness and performance - Both of the alternatives would provide a permanent remedy for the lead contamination, Therefore, either alternative would meet this criterion and reduce the risk associated with groundwater contamination at this Site.

4. Reduction of toxicity, mobility, and volume - Alternative A-1 would not reduce the toxicity, mobility, or volume of contamination through

treatment, however, this alternative would reduce the toxicity through a reduction in the lead concentration levels in the groundwater through natural attenuation processes. Alternative A-2 would reduce the mobility and volume of contamination through treatment.

5. Short-term effectivenes - Alternative A-1 would be the most short-term effective, since this option only consists of collecting groundwater samples. Alternative A-2, however, would not be as short-term effective because of risks posed by activities during construction of the treatment plant and installation of the extraction wells.

6. Implementability - Both alternatives are technically feasible. Since only groundwater sampling would occur for Alternative A-1, this alternative is the most easily implementable. Alternative A-2 is reasonably implementable and reliable since extraction and treatment of groundwater has been demonstrated at numerous sites.

7. Cost - Both of the alternatives are protective of human health and the environment. The costs associated with Alternative A-1 are significantly less than the costs associated with Alternative A-2 and for this reason, Alternative A-1 is the most cost effective remedy.

8. State Acceptance - The State of South Carolina concurs with the monitored natural attenuation alternative, A-1.

OPPORTUNITY FOR COMMUNITY INVOLVEMENT

EPA is conducting a 30-day public comment period, from June 30, 1998 to July 30, 1998, to provide an opportunity for public involvement in the final cleanup decision for the Site. EPA may extend this comment period based upon receipt of a timely request.

EPA will provide the opportunity for a public meeting upon request. Individuals desiring a public meeting should contact either of the EPA contacts listed below as soon as possible.

Public input is an important contribution to the remedy selection process. During the comment period, the public is invited to review this fact sheet, and other supporting documents at the repository, and offer comments to EPA. If, after reviewing the information on the Site, you would like to comment in writing on EPA's preferred alternative, on other information presented in this document, or on other issues relevant to Site cleanup, please submit your comments, to be postmarked no later than July 30, 1998 to:

Ms. Sheri Panabaker
Remedial Project Manager
U.S. Environmental Protection Agency
61 Forsyth Street, WD-NSMB
Atlanta, Georgia 30303

EPA will review all comments received from the public as part of the process of reaching a final decision on the most appropriate remedial alternative for cleanup of the Site. EPA's final choice of a remedy for the Site will be issued in an amendment to the Record of Decision.

<IMG SRC 98087K>

FOR FURTHER INFORMATION CONTACT:

Sheri Panabaker
Remedial Project Manager
&
Cynthia Peurifoy
Community Involvement Coordinator
(404)562-8798 or 1-800-435-9233

U.S. Environmental Protection Agency
61 Forsyth Street, WD-NSMB
Atlanta, Georgia 30303

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Administrative Record and
Information Repository

Hollywood Town Hall
6316 Highway 162
Hollywood, SC 29449
(803)889-3222

GLOSSARY

Administrative Record - A file which is maintained and contained information used by the EPA to make its decision on the selection response action under CERCLA. This file is required to be available for public review and a copy is to be established at or near the site, usually at the information repository. A duplicate file is maintained in a central location such as a regional EPA and/or state office.

Applicable or Relevant and Appropriate Requirements (ARARs) - Requirements which must be met by a response action selected by EPA as a site remedy. "Applicable" requirements are those mandated under one or more Federal or State laws. "Relevant and appropriate" requirements are those which, while not necessarily required, EPA judges to be appropriate for use in that particular case.

Aquifer - An underground geological formation, or group of formations, containing usable amounts of groundwater that can supply wells and springs.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).
A federal law passed in 1980 and modifled in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The Acts create a trust fund, known as Superfund to investigate and clean up abandoned or uncontrolled hazardous waste sites.

Ground water - Underground water that fills pores in soils or openings in rocks. This water can be used for drinking, irrigation, and other purposes.

Information Repository - Materials on Superfund and a specific located conveniently for local residents.

National Priorities List (NPL) - EPA's list of uncontrolled or abandoned hazardous wastes sites eligible for long-term clean up under the Superfund Remedial Program.

National Oil and Hazardous Substances Contingency Plan (NCP) - The Federal regulation that guides the Superfund program.

Public Comment Period - Time provided for the public to review and comment an a proposed EPA action or rulemaking after it is published as a Proposed Plan.

Record of Decision (ROD) - A public document that explains which cleanup alternative will be used at a National Priorities List site and the reasons for choosing the cleanup alternative over other possibilities.

Remedial Design/Remedial Action (RD/RA) - The remedial design (RD) is a plan formulated by either the PRP or EPA or both to provide the appropriate measures to remediate a hazardous waste site. This plan may be modified many times through negotiations between EPA an the PRP. The remedial action (RA) is the implementation of the remedial design.

Solidification/Stabilization - conversion of active organic matter into inert, harmless material and depositing residuals into a solid mass.

Volatile Organic Compounds (VOCs) - An organic (carbo containing) compound that evaporates (volatilizes) readily at room temperature.

APPENDIX D

STATE CONCURRENCE LETTER